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VOL. XCIX., No. 19. NEW YORK, NOVEMBER 10, 1913. WHOLE No. 2,005.

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Organization and Equipment for, and Method of, Handling Street Leaks.[1]

[A paper prepared for the Eighth Annual Meeting, American Gas Institute, by MR. ALAN D. WHITTAKER.]

The course of the mariner is beset with uncharted rocks, floating derelicts and icebergs; the railroad engineer faces possibilities of broken rails and open switches; the gas engineer must be alert against the dangers of leaking gas, and the latter must regard the report of a leak as something to take precedence. It is a bomb with a time fuse. Everyone in the gas company's organization, from janitor to president, should know exactly what to do with a leak complaint should it come to him. Fortunately the public is prone to report gas leaks. Of course, it overdoes the matter, and a large bill is often the cause of an excited telephone message about a big leak. But it is well to accept lots of chaff with the wheat, for we should not discourage this tendency to report leaks, imaginary or real.

Careful questioning by the complaint clerk who receives the notice eliminates a good deal of uncertainty, but as it is not a time to take anything for granted, someone from the gas company must get on the ground quickly, with equipment to locate the leak and either stop it or rob it of its danger.

How this is best done is described by reports from several of the larger cities which are here presented.

1. Slightly abridged.—EDS.

Smaller cities cannot carry the organization described, but it should be arranged in every town that someone in authority be informed of a leak reported any time, day or night. If no complaint man is on duty all night, the telephone operator can receive such complaints, and if there is no night telephone operator, arrangements can be made with the central telephone exchange to call up the superintendent or some other employee. The police and fire departments also make satisfactory arrangements possible for notifying the proper person. Very fair emergency equipment can be kept, even by small plants, if the matter is given careful consideration, and to get the men and tools to the job are details as to which the superintendent can exercise his executive ability. It is very proper to have men and equipment to handle leaks, but no leaks should ever occur from faulty work. The leaks that we prepare for should be caused by forces beyond our control.

Plan and Method of Boston Consolidated Gas Company.[1]—The territory is divided into 6 distribution districts, practically identical with the districts supplied by the 6 independent distributing companies consolidated into the present Company. In each of these territories, main, service and jobbing forces are maintained, who handle all complaints in their several districts. Each local office has a telephone connection with the public exchange, and a private line to a switchboard in the main office at 24 West street, where operators are always on duty. When the report of leak is received the telephone operator immediately plugs-in the complaint telephone of the jobbing office, and the details are received by the clerk in that office. A leak ticket is made out, marked with a time stamp, and immediately given to a local fitter, or is transmitted by private telephone to the proper suburban office. A memorandum of the complaint is recorded in the leak record book, and, if the complaint comes from an outside district, a copy of the leak ticket is sent to the office in that district. A jobber starts for the place as soon as the complaint is received. If he finds it a street leak, he telephones for the emergency gang of the main department to locate and stop the leak. In the meantime the jobber ventilates the building where the complaint originated, inspects adjacent structures, collects data for an accident report if there is any complaint of sickness, and remains on the job till all danger is past. If there is good evidence on the first complaint that the leak comes from the street, a gang from the main department may be sent immediately without waiting for the report of the jobber; but a jobber is sent in any case.

At the main office, and in one other district, jobbers are on the floor all night, while in 4 districts they are on the floor till 10 P.M., and sleep in the building after that hour, subject to call. The men take turns on night duty in rotation, serving one week every month in most cases. A night watchman wakes the men when a complaint is received, except in one office where the men are roused by the telephone gong. The organization of the emergency men of the street department in different districts varies according to local conditions.

In the city proper day emergency gangs of 4 men are maintained at 3 different points, and at least 1 night gang throughout the year, with a second night gang when conditions require it.

The night emergency work in outlying districts is well handled by calling men living close to the local offices, and there are always men available during the daytime. On holidays a gang is kept at all the local headquarters.

Our equipment for handling leaks is less elaborate than that in some companies, and by working from 6 centers the transportation problem is greatly reduced. We have not adopted automobiles for

1. Contributed by J. A. Gould, Supt. Distribution.

emergency work, except as the superintendents' machines are used, still depending upon horses. In the city proper, emergency men at three points can reach the trouble quickly on foot, but the superintendent's cars help in a real emergency and in transferring men from one job to another. At the station, where one night gang looks after two districts, an emergency team is always ready to transport them.

At the 3 outside stations a horse must be harnessed by the watchman when the call is at a distance from the stable. We look after 935 miles of mains, but our troubles are mostly in congested districts.

The building of a double system of sewers and numerous subways constituted a great source of trouble, added to the fact that a large part of old Boston is made on a mud foundation.

Method of Handling Street Leaks in Chicago.[1]—Chicago is divided into 4 divisions, conforming to natural geographical boundries, and the supervision of leak work is by the regular street department, the overhead organization being a general superintendent, an assistant general superintendent, and a superintendent of mains and services, with headquarters in the main office. Each division is under the direct supervision of a superintendent and an assistant, and the superintendent of pressures is also in the street department organization. The main system is divided into two parts (feeder lines and low pressure distribution mains), gas being transferred from the former to latter through district governors. Every opening made in the street, whether for repairing a main or not, is reported on a regular main ticket which is filed in the main office. In each division shop there is originated a sheet showing the location of each main or service gang, a copy of which is sent to the main office. In an emergency requiring the service of workmen, a gang in the vicinity of the trouble can be reached by motorcyle or other means, if they are out of reach of the telephone. There are no special leak repair gangs, the regular men being sufficient to take care of emergencies during the day. At night, men who live in the vicinity of the break or leak can be notified by telephone or picked up by the emergency truck. All the men are subject to call any time during the day or night, Sundays and holidays included.

The feeder lines are regularly patrolled, being covered 2 or 3 times a week by which means a close watch is kept and trouble avoided through conditions being reported before they become serious. These men walk over the main, raising manhole and catch basin covers, to detect any odor of gas. They investigate anything that might indicate a leak, and report the condition of the line to the superintendent of the division at the close of the day.

If a leak is discovered during the day by the patrol, he telephones to the division shop, giving all details. The shop gives him the location of the nearest gang, and either instructs him to go for the gang himself, if in his immediate vicinity, or instructs him to act as watchman until other men get there. If the men can be reached by telephone, it is done, or a man i- sent on a motorcycle to notify them. If neither of these methods is practicable, the emergency truck is sent to gather up a gang, and carry them to the leak. The superintendent of division notifies the general superintendent, and goes to the scene, and the latter notifies the superintendent of mains and the superintendent of pressures, the former going to the leak, the latter making arrangements to shut down the line if necessary.

The first gang to arrive ventilates the surrounding vaults, catch basins, etc., and locates the leak. If, on the arrival of the superintendent, the leak is found to be coming from the feeder line, and re. quires immediate action, steps are taken to reduce the pressure on that section of line, and digging is started, the emergency truck having gathered enough men for that purpose. The leak is then repaired in the usual way.

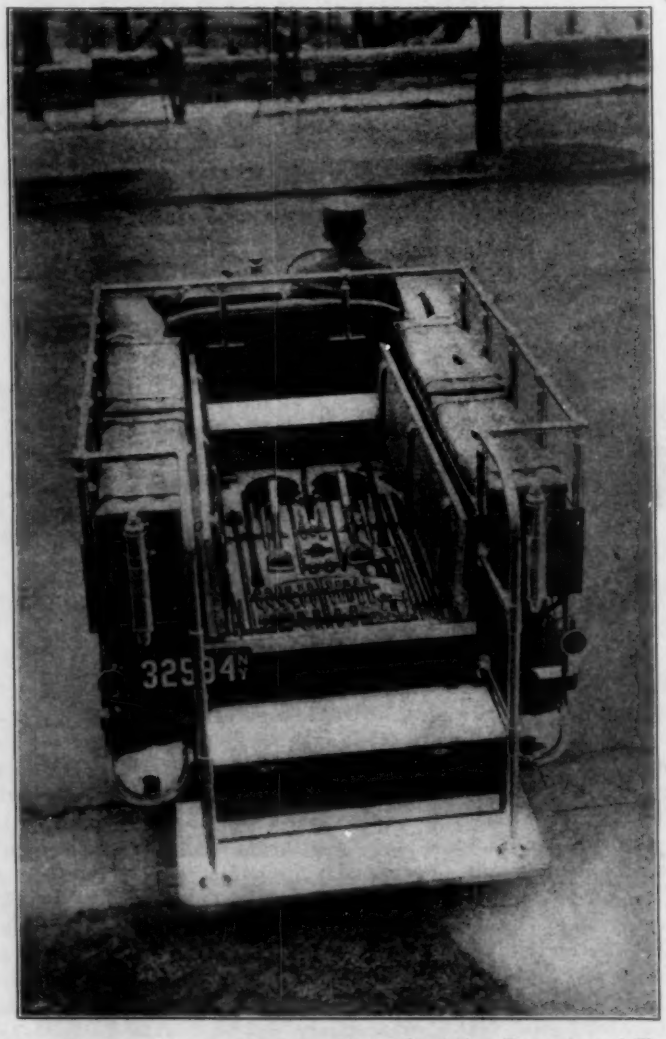
When report of leak is made to main office, the division shop is notified, and the procedure carried out is as in the previous case. If the leak is reported to the main office on Sundays, holidays or at night, the division shop is immediately notified, the general superin tendent and the superintendent of mains being called. If the leak is of such size as to warrant their presence, they immediately go there. If not, they keep in touch with the work by telephone. The emergency truck and the telephone are used to gather the men, the leak being handled as in the first case. If the leak occurs at night, temporary repairs are made, permanent repairs being postponed until daylight.

The emergency truck carries all emergency equipment, including valve-keys, shovels, picks, bars, sledges, caulking tools, pulmotor, rescue apparatus and electric ditch lights. If it is necessasy to have more tools, the truck runs to the shop and brings them out.

1. Contributed by the Distribution Division, Peoples Gas Light and Coke Company.

Method of Handling Street Leaks in New York City.[1]—The Borough of Manhattan contains about 1,500 miles of mains and 130,000 services, divided into 3 distinct street department districts, the division so made that each district contains approximately an equal mileage of mains and an equal number of services. Each district is under the charge of a superintendent, an assistant, and a general foreman, who has supervision of all the work. He is provided with an electric automobile, so that he can easily cover his entire district every day. Each district is further divided into a number of sub districts, each sub-district in charge of a district foreman, responsible to the general foreman. Most leak reports are made by our patrolmen, policemen, or citizens. Immediately on the receipt of such a report the emergency automobile is sent to the location. During regular working hours there is no specially detailed emergency crew, but the chauffeurs of the emergency automobiles are provided with lists of the locations at which work is being done, and, on their way to the leak, pick up a foreman and 3 or 4 workmen. If on arrival the leak is found serious, additional men are summoned. When the leak has been attended to, the chauffeur of the emergency car, before returning to the garage, telephones the office to ascertain if any other leaks have been reported, and, if so, the car proceeds directly to the place, and the necessary repairs are made. During nights, Sundays and holidays each emergency car is assigned a gang of men and a foreman. The chauffeurs have lists of the men in their respective districts, and additional men may be obtained by summoning them from their homes.

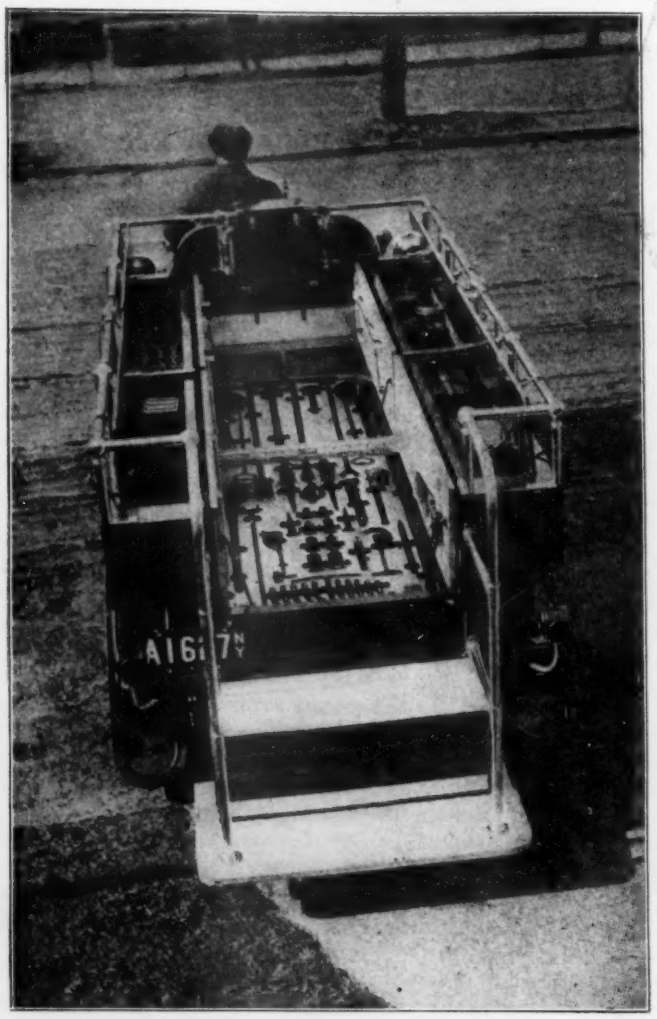
The cuts show the emergency cars, a list of tools and equipment, and the report forms used in respect of each are also appended.



List of Tools and Equipment for Street Lighting Department Emergency Automobiles.

In Emergency House.	On Cars.	
2	2	Round shovels.
1	1	Chisel bar.
0	2	Crow bars.

1, Contributed by Mr. C. C. Simpson, Gen. Supt. Mains, Consolidated Gas Company.



In Emergency House.	On Cars.	
2	2	Picks and handles.
0	1	Striking hammer.
0	1	Caulking hammer.
1	0	Sledge hammer.
0	2	Stop cock keys.
0	2	Valve keys.
0	1	Monkey wrench, 10 to 18 inches.
0	3	Stillson wrenches, 10 to 24 inches.
0	3	Cold chisels.
0	2	Breaking chisels.
2	2	Diamond point chisels.
2	2	½ Round chisels.
0	1	Bull point chisel.
1	1	Dog chisel.
0	2	Yarning irons.
0	13	Stoppers, 4 to 20 inches.
4	0	Steel wedges for frost.
		2— 3 -inch gas bags.
		2— 4 " " "
		2— 6 " " "
		2— 8 " " "
		2—10 " " "
		2—12 " " "
		6— ⅜ " Screw plugs.
		6— ½ " " "
		6— ¾ " " "
		6— 1 " " "
		6— 1¼ " " "
		6— 2 " " "
		6— ⅜ " Caps.
		6— ½ " "
		6— ¾ " "
		6— 1 " "
		6— 1¼ " "
		6— 1½ " "
		6— 2 " "
		5—Caulking tools.
		4—Taps, 1 inch to 2 inch.
		1—Lamp rod.
		1—Trowel.
		2—Red lanterns.
		White or red lead.
		1— Small Johnson's first aid kit.
		1—Cross-cut hand saw.
		1—Pair 10-inch pliers.
		1—Screwdriver, 18-inch.
		1—Squirt oil can, with oil.
		1—Key for drip plugs.
		1—Sounding rod for drips.
		2—Subway cover hooks.
		1—Frame cover for coal chutes.
		2—Pair rubber gloves.
		1—Electric lamp, large.
		1— " " small.
		16—¾-inch to 8-inch wood plugs.
		Soap.
		Fire clay.
		Pipe yarn.
		15 feet 1¼-inch rope.
		Key book of mains.
		2—3-wheel cutters.
		⅛ and ¼-inch caps and plugs.
		Disinfectant for condensation on leaks.
		Meter locks.
		1—Draeger rescue apparatus (complete.)
		1—Pulmotor.

Charge to ..... Gas Co.
Date .....19 No. .....
Location .....
Name .....
Complaint .....
.....
Reported by .....
Work done .....
.....

Labor in Days.

Rate.	Cons.	Mutual.	Standard.	N. A.	

Materials Used—W. Iron.

Size.	Pipe. Black.	Pipe. Galv.	Bush-ings.	Tees.	Caps.	Coup-lings.	Cro's.	Ells.	Nip-ples.	Plugs.	Long Threads.	Valves.	Boxes.

Material Used—Cast Iron.

Size.	Pipe.	Bends	Cro's.	Tees.	Drips.	Slev's.	Split Sleeve	Reducers.	Caps.	Plugs.	Lead	Yarn

Completed ....19 ....Foreman.
Entered on ....sheet ..... Billed by .....
Entered on "New Service" card ..... Stubbed by .....
Pavement notice sent to G/O ....By .....

I certify that the above service is "gas tight" and in good condition.

.....Fitter.

Report of Emergency Department for 24 Hours Ending 7 A.M., March 28, 1913.

Location.	Reported by	Call Received.	Car No.	Left Yard.	Arrived at Leak.	Returned to Yard.	Nature of Complaint.	Remarks
59th St. and Third Ave.	Consol. Sub. Co.	8:48 A.M.	4	8:49	8:59	9:30	Leak.	No leak. Fire caused by Edison burnout.
960 Third Ave.	Janitor.	10:10 A.M.	4	10:11	10:20	11:40	"	Shut-off stop-cock supplying gas engine; leak at hose.
56 East 75th St.	Standard.	10:25 A.M.	4	3d Ave. 11:04	11:10	11:40	"	Strong smell of gas from street.
1435 Second Ave.	111th St. St. Dept.	1:14 P.M.	4	1:15	1:29	2:25	"	Locked stop-cock on cooker on top floor. Leak at thumb cock.
62d St. and Second Ave.	Consol. Sub. Co.	1:55 P.M.	4	1435 2d Ave. 2:02	2:08	2:25	"	Left man to meet subway people.
866 Second Ave.	Standard fittter.	4:11 P.M.	4	4:11:12	4:25	5:54	"	Secured 1¼-inch service, corroded in coal chute.
126 West 72d St.	Hill.	5:05 P.M.	On foot	5:06	5:16	5:50	"	Locked 30 lt. con. meter in cellar Fixture broken.
340 Columbus Ave.	Respoli Bros.	5:55 P.M.	4	5:55:10	5:58	6:38	"	Secured leaks at outlet cone, 3 lt. con. and inlet cone of 10 lt. con. meters in cellar.
31 West 75th St.	Tanenbaum.	5:55 P.M.	4	Col. Ave. 6:10	6:11	6:38	"	Tightened inlet coupling on 20 lt.con. meter in cellar.
N. W. cor. Broadway and 21st St.	Edison Co.	7:29 P. M	5	7:30	7:44	8:35	"	Slight smell coming through electric light post and in manhole on N. W. cor.; will hold.
S. E. cor. 20th St. and Fourth Ave.	Edison Co.	7:29 P.M.	5	B'way 8:00	8:01	8:35	"	Slight smell coming through electric light post and in manhole on N. E. cor. stuffed ducts; will hold.
310 West 69th St.	Ciancia	7:34 P.M.	4	7:34:10	7:36	7:50	"	Repaired leak at right and left nipple on cooker in apartment No. 5.

(Signed) PHILIP DUNNE, *Superintendent Emergency Department.*

Location of Street Opening.

Street.	Side.	No.	Location.	Size of Opening.	Dist. from Curb.	Kind of Pavement.
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

Description of Service.

Size of service..... Size of main..... ...inch.
Service on.....side Depth of main.....
Main is .....ft.....inch. .....Curb Line.
Service is.....ft.....inch. Curb..... Street.
Connected to.. .....Gas Co. Drips to.....
Badged..... Valve.....

Transfer of Services.

Size of Service.	Transferred from.	Size of Main.	Transferred to.	Size of Main.
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

Service cut-off.....
Remarks:.....
.....
.....
.....
.....
.....
.....
.....

From 5 P.M. to 9 A.M., the emergency service is in charge of 2 night superintendents. Sundays and holidays, during the daytime, a district superintendent and an assistant general superintendent, or the engineer of the department, are on duty in the main office—in regular rotation. Each day the districts send to the main office a report of the emergency calls the day preceding, noting the work done. All leaks reported are not street leaks, as it is the practice to send out the car in every case of a leak. By means of the daily emergency report the main office is kept informed of the leak work done, and the assistant general superintendent of mains, and the engineer of the department, cover all the work in progress in the entire city quite thoroughly. It is impossible for them to make a daily inspection of all the work, but the branch superintendents and their assistants cover every job in their respective districts each day, as do also the general foremen; and each evening the latter and the district foremen report to the branch offices and consult with the district superintendents in regard to the work. Twice a week a meeting of the branch superintendents, with the assistant general superintendent and the engineer, is held in the office of the general superintendent of mains, the branch superintendents having with them for discussion reports of the work done in their districts during the preceding week.

Method of Handling Street Leaks in Philadelphia.[1]—The distribution area of Philadelphia is divided into five districts, a division made to effect economic management by providing bases of supplies and operation at various points throughout the city. The district organizations are kept as similar as possible, with regard to local conditions which may more or less affect the methods. The employees solely or partially concerned with street leaks are: (*a*) Executive; and (*b*), operative. In the first class is the superintendent, or assistant superintendent, one of whose special duties is to supervise this work, the foreman of mains and his assistant being in close touch with both the office and street men. When in the office the latter men direct the movements of the various gangs, and issue general instructions as to special cases. When on the street they supervise the various jobs and issue instructions to those under their authority. To the executive class might be added the street main clerk, whose work is continually in the office, and who, in the absence from the office of the street main foreman, directs the movements of the gangs and receives reports of gang foremen. He also audits and files records of work, makes out orders giving proper information on each new leak job. The operative class comprises gang foremen, whose work keeps them continually on the street in direct charge of the gangs searching for and repairing leaks, the caulkers and laborers comprising such gangs and messengers necessary to carry information from the office to the street. In regular working hours, these employees attend to their various duties as described. Outside of regular working hours the following practices are followed: A clerk,

1. Contributed by Mr. H. B. Anderson, Supt. City Gas Works, Philadelphia District, U. G. I. Co.

known as the dispatching clerk, who is on duty outside of regular hours, is carefully instructed in the administration of details, and in obtaining from the office records information about our underground structures, etc. Saturday afternoons, or when work has been stopped by storms, etc., a detail of men, who (the number being regulated by the conditions of the work and the weather) are stationed in the shop or else on a job on the street where they may be communicated with by telephone. This gang works on any leak received until a new detail arrives, or until it is considered safe to leave. Sundays and holidays a detail similar to that just described is maintained, or if conditions do not justify this, we have on duty in the office at least one man capable of correctly judging the seriousness of any reported street leak, and determining the course to be pursued. Such a man is recruited from the capable caulkers in the district. For each night, when a regular night leak gang is not working, a detail of not less than 5 men, including a man capable of acting as foreman, and a caulker, are chosen, the men being notified to remain at their homes all night. This insures us men adequate to care for any ordinary leak, whom we can procure if desired. The number of men from whom these are chosen is such that each man is detailed for 3 successive nights every 3 weeks. No extra pay is given for this service. The night complaint men, generally first to discover that a leak is in the street, have a list showing men detailed for that night, and, after reporting the leak by telephone to the office, they at once notify the detail. The first man notified comes to the shop, obtains wagon with tools, and proceeds to the job, while the remaining men go direct to job.

If a leak is extraordinarily bad, or more men are needed on regular detail, a man is dispatched to notify the men living nearest the shop, whose addresses are found on another list.

While not attempting to describe in detail the tool quipment, mention may be made of the "leak drill" used instead of a bar, to locate leaks. This tool consists of a long, 1-inch steel twist drill 6 inches long, with a threaded shank attached to a 3-foot length of ¾ wrought iron pipe. A 1 by 1¾ tee is screwed to the end of the pipe, and an iron bar slipped through the tee makes a lever or handle to turn the drill. An electric lamp is used at night, operated by 6 dry cells, giving a light of about 6 candle power which will last 14 hours. The batteries are in a wooden box, with hinged cover, 2 incandescent bulbs in heavy sockets with reflector and bull's eye cover, one fastened permanently in the end of the containing box, the other on a cord 6 feet long.

Medicine, etc., for treating employees or others affected by gas, is conveniently carried in a leather bag, 8½ by 4½ inches.

Tools and necessary men are transported by a one-horse wagon, provided with material to deal with almost any leak emergency, the equipment being made the subject of special inventories and examination. The wagon is closed with locked doors at each end, the keys being kept in the office until a driver reports that he is about to use the wagon. When leak work is extraordinily heavy, or in emergency cases, the superintendent's automobile is used to transport tools and men. The general foreman and some of the street and gang foremen have motorcycles, those not having one being provided with bicycles. An extra bicycle is provided for each leak gang.

When the office receives notice of a street leak (usually by telephone), it obtains from the person reporting the details as to its extent, possibility of good ventilation, with an idea of the general surroundings and information concerning persons claiming to have been affected by the gas. From this he judges what should be the immediate disposition of the leak, considering the following points: An odor is usually reported as strong, slight or doubtful. If any leak, regardless of its location, is reported as strong, the man reporting it is ordered, except in cases where it is imperative to use him for another purpose, to stay on the job until relieved by another man or by the leak gang. The location of the odor, if in a cellar, at one stopbox only, or at more than one stopbox, etc., serves as a guide to the office man in either sending a gang to the leak, or a street foreman to decide if immediate work may be delayed.

An odor, reported as strong in cellar or cellars and at stop and drain boxes at curb, indicating probably a broken main or other extensive leak, would be considered a case for instant work and a gang dispatched immediately. Any strong odor at the top of a lamppost, or in one gas stopbox only, indicating probably a break at the bottom of the post or in the service at the cock, is classed as a case to be visited by a street foreman, who determines definitely whether the leak should be watched or worked. When the odor is reported slight, and if ventilation will remove it, the man reporting is instructed to proceed with his work, and the case turned over to a street foreman, who makes a visit within an hour or two to decide on the immediate course to be pursued. If the odor is reported as doubtful, an examination is made by a street foreman, who decides whether the odor is that of illuminating gas.

On receipt of a street leak, the street main clerk, or a man designated, fills in a form known as a "Street Leak Order." On this we note the date and time of report, name of man reporting, and information concerning size and location of gas mains, etc. A space is provided for a sketch of limited size to aid the leak gang foreman; in addition to this order there is originated a 3 by 5 card, bearing the address and date, provided with a column in which to enter the results of conditions found on each visit. This card is kept in the office and posted as reports on this leak are made. If the leak needs further examination, or has been temporarily repaired, this card will so indicate. It is filed behind a date marker, thus the examinations due any day are automatically brought to light at the proper time. Examinations at any locations are made according to the following rules: When a "slight odor" case is not worked because of more urgent leaks, an examination is made at least once every day until leak has been worked on and found. After a leak has been found and stopped, it is not assumed that the complaint is entirely remedied, as another leak may be the cause of complaint. Therefore, an examination is made the day following that of the repair (temporary or permanent) to ascertain if it has been remedied. If an odor exists, active work should be resumed as soon as possible, and even if the complaint seems entirely remedied, a second examination is made one week after the first. Such examinations are omitted in cases where cause of the leak is definitely known, such as broken lamppost, service cock broken by fitter, or pickhole in gas pipe. Examinations are also made in cases where "no odor" is found on first visit. After the two records above mentioned have been originated, the next step of the office is to "dispatch the leak." If it is decided necessary to work immediately, a gang is notified by 'phone, or messenger. The telephone is put to most extensive use. Whenever a gang is working where a "pay station" or store is near at hand, the foreman of the gang on his arrival on the job will notify the office of this number. In emergency cases, where such a 'phone is not obtainable, the office will obtain from the telephone company the location of the nearest 'phone, and calling, will ask the person answering, most likely a consumer, if he will be kind enough to ask our foreman working in the street to communicate at once with the office. If it is unnecessary to work the leak at once, it is held and given to a street foreman for examination. If the report of the leak says that any person claims to have been affected by gas, the next step in especially serious cases is to notify the claim department, regardless of the time of day. This notification, if not during regular working hours, is delayed in cases not serious; but, in any case, one of the company's physicians is requested immediately to visit the persons affected.

For each visit to a leak location, a "Street Leak Progress Report" is filled out by the man making the examination. It shows time of day and history of conditions found with work done. If the work on a leak is continued without interruption over a period of more than one day, a report is made for each day, and if foreman is replaced during progress of work, each man makes report of the work done by him. Reports for work done any day should be in the office by the end of that day. Any leak found is reported at once by telephone. Each report is carefully audited to see it contains all pertinent information, and is filed daily so the complete history of any leak is available.

During ordinary winter weather no regular night gang is worked, and when such is necessary its size is about ½ that of day force.

Overtime hours during especially strenuous periods should be reduced as much as possible. For short stretches most men can work 16 to 18 hours a day, and if necessary, 24-hour periods. During such periods the varied length of the working day can be made to result in gangs reporting at intervals throughout the day, and this will allow greater ease and speed of dispatching leaks received before such a gang is expected.

In case of lack of foremen, other men, who with a little instruction will prove capable, should be selected from the best employees of the fitting department. Even though these men are unfamiliar with digging and street conditions, they are far preferable to new men trained in digging work but unfamiliar with gas and its effects. The main points in efficiently organizing for handling street leaks are common sense and thoroughness, together with the highest regard for safety always.

Method for Handling Street Leaks in St. Paul, Minn.—Ordinarily a leak complaint comes in by telephone. The operator gets the first information, and if the complaint is very serious the call is put directly on the distribution superintendent's line. Ordinarily complaints are written up by the complaint clerk, and a regular order put in the chute communicating with the shop foreman's office. Of course, the complaint clerk is supposed to obtain all information possible, such as the name of the party reporting, nature of the leak, if in house, basement or street, how long it has been noticed, and particular attention to getting the correct address. If reported as a street leak, the shop foreman telephones the superintendent's office, giving the address, and states if he can get a man there promptly. Generally he is expected to send a man on all leak complaints to safeguard persons and property. He ventilates premises, cautions persons, and keeps guard until the repair crew is on the job.

Prompt service of the fitting department is ensured as follows: First, a motorcycle is maintained by the department for urgent complaint and leak orders; second, each fitter's duplicate orders, on which he is working, are kept in labeled files so that the shop foreman knows in what part of town each fitter is at work at any time. In case the motorcycle man is out, or the machine not in commission, or the complaint is a long way from office, by a liberal use of telephones, of parties leaving orders, the fitter in the vicinity of the complaint can be communicated with, and sent to care for the leak at once. If the shop foreman cannot care for the complaint promptly he notifies the superintendent's office, and a street foreman, or someone from the superintendent's office, is sent. The reason for notifying the superintendent's office, when a leak order is first received by the shop foreman, is to enable his office to get in touch with a street foreman pending a report from the fitter sent to investigate the complaint.

We have divided our city into 2 divisions, a general service and repair foreman, with 5 or 6 crews being placed in each division. Each general foreman reports or telephones, early each morning, the schedule of each crew for the day, also telephones or reports to the office 2 or 3 times each day for special orders or complaints. When the fitter sent on a complaint, reports by telephone that immediate attention is necessary, and as to the probable extent of the leak, we have either arranged for reaching the general foreman or can give the fitter the location of the nearest crew, who notifies them of the leak. These crews, consisting of 4 to 6 men, always have an experienced gas man capable of handling ordinary leaks. The general foreman is also notified by the superintendent's office as soon as possible to get on the job and assume the responsibility. To prevent any friction, such as the crew boss or foreman refusing to look after leak promptly when notified by the shop fitter, we have given each crew foreman orders to telephone to the superintendent's office whenever anyone tells him of a leak or wants him to do work not authorized by his general foreman. Each service box carries a set of caulking irons, 1 or 2 bars of ordinary laundry soap, and such small supplies as are generally necessary for ordinary street leaks. A complaint man with motorcycle is kept on duty nights and Sundays. In case of street leak he telephones the superintendent's house (or the assistant) from the premises or vicinity, making report of the seriousness of the leak, and gives instructions what to do pending the arrival of the repair crew.

Both general foremen have telephones, and each has a list of about ½ dozen men quickly accessible by telephone or messenger, so that a crew can be assembled within a reasonably short time. The teaming contractor has a telephone, so that a wagon and driver can be secured at any time. Picks and shovels are available at the office or at the nearest service box to the leak. Time-and-½ is allowed for Sunday work and night work to fitters and laborers, and general foremen are on a monthly salary. We have had no occasion to use other than lanterns or pocket electric torches on our work.

A "servus helmet," kept in the department for 3 or 4 years, has only been used once or twice.

In the business section, where traffic is heavy, night work is sometimes desirable. Ordinarily, however, it has not been our practice unless imperative. Sunday work, on the other hand, is generally desirable, both from the absence of ordinary street traffic and also because we can generally get more skilled help when our regular work is not going on. Special equipment or supplies can be secured at the office or from the storehouse; the storekeeper or the superintendent can be reached by telephone, both having keys for the storeroom. In the cold months the main difference is in securing crews. We generally find employment for some of the older and more experienced street men in the meter repair shop and fitting shop, overhauling stock and tools and the like. It is, therefore, an easy matter to make up 1 or 2 crews at any time during working hours, and if necessary we have the nucleus for half a dozen crews, and can pick up what extra labor is needed with little delay. Night and Sunday complaints are handled as in the summer months. Owing to the slow digging when the ground is frozen, our rule is to ventilate the premises, sinking one or more holes near the foundation walls to intercept the current of gas entering the building. This must be done before all other work, unless sufficient help is at hand to make excavation for the repair of the leak at the same time. Drilling over the mains and services is generally done to locate the leak, but it is frequently necessary to dig test holes 2 or 3 feet below the mains to intercept the currents of gas travelling in the ground.

The superintendent's office is always kept advised regarding each leak. If a leak is not repaired during the day the superintendent is notified, so that proper precautions or instructions can be issued. In case the leak has caused any damage, or any one claims to have been affected by it, or if the complaint man thinks there is any chance of claim being made for injury, some one is sent from the superintendent's office to thoroughly investigate and make a written report, to forestall unjustified claims.

Each repair order issued to the foreman must be filled out, stating the nature of the leak and repairs made, the labor and material required and the probable cause of the leak, with a working drawing of the location. In the winter it is generally necessary to call back 2 or 3 times after a leak is repaired to see that the dead gas held in the ground does not seep into adjoining premises. It is often necessary to maintain vent holes outside the foundations of the buildings for days after the leak is repaired.

Notice on the Production and Application of Oil Gas.

[By a Manchester Man.]

For the lighting of railway carriages oil gas has been found an extremely desirable agent, in fact it is the main use to which it can be applied, and it is owing to its exceptional characteristics that it is specially applicable for railway purposes. The system of production is not by any means perfect. It is in fact wasteful, but there is an opening for improved and more economical methods. In Great Britain, where it has been in use for nearly a generation, it has been found so convenient that it is more largely used than any other competing material or system. The cost of production works out at $1.20 per 500 cubic feet, and the quantity required annually for British railways is probably 550,000,000 cubic feet. In other European countries it is also used on a very extensive scale. The capital outlay per carriage installation is very small compared with other systems, such as electrical lighting, and owing to its considerable calorific and illuminating properties as compared with say coal gas, a railway coach provided with it can be worked for several hundred miles without the gas holder becoming exhausted, and these advantages have brought it into extensive use on German railways. Now, that it has been so largely applied, it can hold its own against competing systems, such as coal gas illumination, owing to the great expense, which would have to be incurred to provide the charging plant of coal gas. The cost of oil gas has induced several railway companies to experiment with other systems, but no competing installation has so far been carried out on an extensive scale. The quantity of oil gas used increases yearly, and it is more likely that efforts will be made to improve and cheapen its production, than to find a suitable substitute. As the safety of the travelling public is an important point for the consideration of railway managers, there appears to be no reason to assume that it is endangered by the use of oil gas, or that the substitution of coal gas would render travelling safer.

The manufacture of oil gas in large quantities for railway purposes involves several large items of expenditure, the most important probably being the maintenance charge, which reached the high figure of $0.56 per 1,000 cubic feet. A plant producing 16,000,000 cubic feet of gas annually would require, for the renewal of retorts and their settings, in round figures, $9,000, and this outlay has not undergone any great reduction or change for a very long period, showing that it has not been found possible to introduce any greatly improved system of manufacture. With retorts constructed, bedded and worked as now usual, no marked improvement appears likely. Economy could only be effected by a radically new system or modification of the present

one. The economic production of oil gas does not seem possible, so long as cast iron retorts have to be used, which with their settings have to be so frequently replaced. An expert has suggested the adoption of vertical retorts, which could be lowered into their settings without structural alterations and renewals each time, would result in an important saving; such an improvement would have the further advantage that any scale formed would not come in co tact with the firebrick. Moreover, the unsupported weight, due to the horizontal setting, would not then diminish the life of the retort, which would also be more uniformly heated, so that the crucial difficulty of local burning would be eliminated. In regard to the setting itself, the temperature during the process of manufacture is not so exceptionally high, that firebrick made from carefully selected shales, which occur in several parts of Great Britain, should not continue in good condition in a vertical setting. It is, of course, essential that the fireclay should not be contaminated with oxide of iron and slag from the fire. It would be an advantage to use coke for heating the retorts, which has been gasified in a producer; by doing so important advantages would be obtained, including temperature control, fuel economy and uniform heating.

A very considerable loss ensues from the escape of waste heat. The fires of a range of retorts, as at present constructed, all join up to one large chimney flue, and as the gases leave the retorts at a temperature of 1,600 to 1,700° F., there would be no difficulty in designing appliances to utilize the heat, which would be more than ample to raise the steam required for compressing operations, the cost of which could in that way be very considerably reduced. The advantages accruing to working boilers under such conditions are well known to engineers, and it is certainly remarkable that this waste should have been allowed for so many years and such an obvious economy overlooked. The system would be simpler and much cheaper in installments in which one lot of fuel only is used in producers, instead of separate lots for retorts and boilers. The item of stoking would almost be eliminated, possibly entirely dispensed with, whilst the consumption of fuel would be limited to that required to gasify the oil. As worked at present the retorts require 18 lbs. of coke to gasify one gallon of oil, equal to two tons of coal for every ton of gas produced. The working of coal gas retorts can scarcely be used as a standard, as the processes differ materially, the difference besng nevertheless very striking. The coke consumption in a modern, gas-fired, coal gas retort, is 1-30th to 1-40th of the coal carbonized, the whole operation being conducted at a substantially higher temperature than that of the oil gas retorts.

The difference in the quantity of the fuel required, shown in the figures given above, is so great that there is an obvious opening for an improved system. When the oil gas has been produced and stored in cylinders its successful utilization is made possible by several ingenious automatic appliances placed between the storage cylinders and the lamps. Prolonged experience and repeated improvements have now made these contrivances practically perfect, especially since the introduction of inverted burners and small incandescent mantles. Oil gas, and the process by which it is made available for railway carriage lighting, are the inventions of Herr Julius Pintsch, who perfected and introduced the system about 30 years ag . The process is now practically as he made it, whilst its utilization within the carriage has undergone repeated improvements and may now be described as perfect; at least, no possibility of further improvement seems likely. In order to improve the system of producing oil gas, railway managers should place the problem in the hands of chemists. It does not come within the range of an engineers' training; the mechanical portions of the process and its application have been carried as far as possible by them. The difficulties engineers have to contend with, and with which they have not been able to grapple, as they require the cooperation of the chemist, may be summarized as follows:

The process of producing oil gas depends on the fact that when oil is made to flow slowly over heated surfaces (the essential feature of Pintsch's invention), tar and coke are formed, as the oil undergoes partial distillation by being kept for some time in a gaseous condition in contact with the heated retorts. These retorts, in which the process takes place, are made of cast iron. The heating not being uniform they soon give way, owing partly to the setting and to the system of firing. The average production of each retort is limited to 150,000 cubic feet of gas, and it has then to be replaced, involving a new setting as well as a new retort. The setting itself is destroyed by fused oxide of iron dropping on to it. The horizontal setting of the retorts, which are net supported throughout their entire length, causes them when heated to give between the supports. The heavy, continuous outlay on oil gas works is entirely due to these defects, other portions of the plants giving much less trouble and invoking relatively insignificant renewal costs. In the case of works of normal size, the entire cost of manufacturing oil gas according to Pintsch's invention, works out at $2.65 per 1,000 cubic feet, of which $0.72 represents the cost of compressing the gas, which contains about 50 per cent. more heat units than an equal volume of coal gas, compared with which its cost is double, taking coal gas at $0.66 per 1,000 cubic feet. This greater cost is, however, neutralized by many advantages possessed by oil gas for railway carriage lighting.

The raw material out of which the oil gas is produced is an oil commercially known as gas oil, a distillate of natural petroleum, intermediate between lubricating and burning oils. It is both cheap and well adapted for the process, as it possesses a heating value of about 20,000 B.T.U. per pound, which produces about 9 cubic feet of gas of a heating value of 900 B.T.U. per cubic foot. Expressed somewhat differently 8,100 heat units out of a possible 20,000 are made available for illuminating purposes, so over 50 per cent. is thus lost in the process of manufacture, due to the very large production of tar, hard carbon and other material which are deposited within the retorts. It may become possible in the future to obtain a very much larger percentage of gas of high calorific value from oil; the present loss of about 60 per cent. is excessive. The most recent progress has been due to the known fact that we are not able to completely gasify oil by heating, but that the portion of the oil not gasified can be recovered as a valuable bye-product instead of a relatively worthless one.

Liquid Purification of Coal Gas.

[Prepared by Mr. James G. O'Neill, for Eighth Annual Meeting, American Gas Institute.[1]]

The purifying of illuminating gas from hydrogen sulphide is recognized as one of the problems in the economical production of gas, especially in the United States, where the manufacturer is forced by unreasonable laws to purify gas to an abnormal extent. Now that coal gas again is about to be used extensively, and since crude coal gas may contain anywhere from 400 to 900 grains of hydrogen sulphide per 100 cubic feet, the problem becomes of great importance; for it means that, if we continue to use the oxide method, as it is at present, purifying capacity will have to be greatly increased. It is, therefore, important that we recognize the imperfections of present practice and find a more satisfactory coal gas purification process.

Reviewing the results obtained with oxide purification, we find oxide is seldom used after it contains 45 per cent. of free sulphnr, which is generally after it has been revivified 3 or 4 times; consequently, the maximum quantity of gas, containing 400 grains of hydrogen sulphide per 100 cubic feet that this oxide has purified, is 50,000 cubic feet per bushel. Oxide can be made to take up as much as 60 per cent. sulphur, purifying 80,000 cubic feet per bushel, but as it is necessary to revivify the oxide 8 to 10 times, experience taught us that the cost of this extra handling makes the purification cost excessive. If it were not necessary to handle the oxide 8 to 10 times to have it contain 60 per cent. of free sulphur, it would be a great advantage to produce the higher sulphur oxide. The cost of oxide in purifying coal gas containing 400 grains per 100 cubic feet, under ordinary circumstances is at least .6 of a cent per 1,000 cubic feet, and, in most cases, the labor is at least .4, a total cost, not counting upkeep, of 1 cent per 1,000 cubic feet. If we receive a coal which gives 700 or 800 grains per 100 cubic feet, we will find the cost of purification much greater and the capacity of our purification system inadequate, and as during certain periods an increased quantity of gas must be produced, a sufficiently large purifying capacity means a large installation cost with little return. The year-to-year increase in the quantity of gas to be purified means more purifying boxes, requiring more space for them and for revivifying and storing oxide. In brief, oxide purification of coal gas is bulky and non-elastic, a stumbling block in the path of gas manufacturing progress.

The purifying of carbureted water gas is a much simpler proposition, the low content of hydrogen sulphide in the gas making, the purifying cost low and the space required not excessive; bu in gas purification as now practiced there is always possibility of serious accident from the igniting of an explosive mixture of gas and air by

1. Slightly abridged.—Eds.

(*Continued on page* 298.)

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NEW YORK, MONDAY, NOVEMBER 10, 1913.

[Official Notice.]

Gas Congress Representative, Wisconsin Gas Association.

Wisconsin Gas Association,
Office of Secretary,
Milwaukee, Wis., Oct. 29, 1913.

To the Members, Wisconsin Gas Association—Gentlemen: The Executive Committee of the Wisconsin Gas Association, acting on the resolution adopted at our last annual meeting, has selected, as its unanimous choice, Mr. R. B. Brown, General Manager and Engineer, the Milwaukee Gas Light Company, as the delegate to represent the Wisconsin Gas Association at the Gas Congress to be held in San Francisco, during the week, beginning September 27th, 1915.

Yours truly, Henry Harman, Secy.

DEATH OF BYRON E. CHOLLAR.

The fraternity will hear, with unfeigned regret, deep and lasting, of the death of Mr. Byron Edgar Chollar, for two-score years and more prominently identified with the gas industry. He passed away, at his home, 2840 Troost avenue, Kansas City, Mo., the afternoon of the 27th ult. He was in his 74th year, having been born in Brooklyn, Conn., May 29th, 1840.

BRIEFLY TOLD.

Autumn Meeting, New Jersey State Gas Association.—Through the attention of Mr. O. F. Potter, Secretary, we are informed that the autumnal meeting of the New Jersey State Gas Association will be held the afternoon (2 o'clock) of the 12th inst., in the office building of the Public Service Gas Company, 84 Sip avenue, Jersey City. The main theme for the meeting will have to do with "New Business," which many sided, ever-present topic is to be presented by a man of national fame in advertising lines. Four "10-minute" papers are arranged for, In these "Street Lighting" will be submitted by Mr. Ralph H. Garrison, Atlantic Highlands, N. J.; Mr. Henry Cohen, of Atlantic City, N. J., is to discuss "Salesmanship." The matter of "New Business" will be outlined by that seasoned, successful campaigner, Mr. James P. Hanlan, of the Public Service Gas Company, of New Jersey; and Mr. P. Frank Buck (Millville, N. J.) will narrate a story respecting "Soliciting." Secretary Potter, judging by present indications, looks for a large attendance; and, no matter how "big" it is, he can be surely counted on to have accommodations for all who are proposing to put the New Jersey Association in the forefront for a record meeting.

Educational Course, 1913-14 Plan, National Commercial Gas Association.—The National Commercial Gas Association's Course, on "Utilization of Gas Appliances," was started the 1st inst., with an enrollment of 1,800 students. The list treats of the principles concerning the production, distribution and utilization of light; also, of the construction and proper use of heating and cooking appliances, besides giving elementary descriptions of the principles of combustion, with explanations of the phenomena involved. That it has aroused more than ordinary attention is evidenced by the encouraging preliminary enrollment and the continued daily receipts of other applications.

October Session, "The Gas Meeters," Philadelphia Section.—The regular session for October of the Philadelphia Section, "The Gas Meeters," was held the 30th ult., in the New Bingham Hotel, with an attendance of 56 members and guests. The Nestor of the gas industry, Mr. John McIlhenny, of Messrs. Helme & McIlhenny, was present, and gave a most interesting narrative regarding the early days of the gas industry. It is needless to say that the utterances of the grand veteran were of the smooth bore order, and his Columbus (Ga.) experiences were redolent of the days of shots and shells. Short addresses were made by Commissioner W. H. Pettes, of the New York Section, that knowledgable campaigner; by Mr. Lucius S. Bigelow (the putative father of the National Commercial Gas Association; by Mr. J. B. Taylor; and by Mr. A. D. Valentine, who reports to Mr. Conroy, the major-general representative in the East of the General Gas Light Company. No meeting of this Section will be held during November, but the next session is to be a gala one, the date thereof being set for the evening of December 4th, during the week of the annual meeting, National Commercial Gas Association, in Philadelphia. The plan was put through by Grand Chairman, "Will" Barnes, who has named a committee to make all necessary arrangements. It is designated as "The Gas Meeters' Night," and Secretary Stichter declares it will be a night of nights.

Government Investigation of All Public Utilities.—Secretary of Commerce Redfield, in an address recently delivered in Flint, Mich., announced that his department proposes to begin an investigation of public utility corporations, which inquiry will be made by the Bureau of Standards. It will be conducted in a spirit of entire friendliness, with the object of aiding both the corporations and the public service commissions of the various States and cities. Congress will be asked for an appropriation of $100,000 to enable the Bureau of Standards to carry on such investigations as would fix standards of service for public utility companies, thus assisting public service commissioners and other authorities in the regulation and control of utilities.

November Meeting, Philadelphia Section, Illuminating Engineering Society.—The November meeting, Philadelphia Section, I. E. S., will be held in Philadelphia, at 8 P.M., Thursday, the 20th inst. The sessions will be preceded by a dinner, served in the dining room, of the Engineers' Club, the premises of which are in 1317 Spruce street. The Chair will be occupied by Prof. George A. Hoadley, and this programme has been arranged: Joint meeting with the opthalmologists of Philadelphia, in College of Physicians and Surgeons; a paper on "Some Effects of Artificial Light upon the Eyes," by Dr. Edward A. Shumway; also, one on "The Effect of Mercury Arc Lamps upon the Eyes," by Dr. George I. Crampton; and another by Prof. Arthur J. Rowland, whose theme is "The Lighting of a Public Library."

Death of Mr. Joseph Ernest Hodgson.—With sorrow we place upon the record the death of Mr. Joseph Ernest Hodgson, who passed away, at his home, 18 Prospect street, Gloversville, N. Y., the evening of Sunday, October 26th. His death was traceable to an operation for appendicitis, made about a year ago, from the effects of which he never thoroughly rallied. Mr. Hodgson was born in Brooklyn, N. Y., May 27, 1873, his father (John H. Hodgson) being at the time a prominent builder in the named city. He gained his early tuition in the public schools of Brooklyn and in the famed Potytechnic Institute

of that city, subsequently graduating from Cornell University in the Class of 1897. His course in Cornell included mechanical and electrical engineering, and, of course, it was along these lines that his business career was developed. His first activity was with the Brooklyn Rapid Transit Company, and in 1902 he joined the staff of the Westchester Lighting Company, when that corporation was under direct control of the U. G. I. Company. In 1907, or about the time that the Westchester corporation became affiliated with the interests controlling the Consolidated Gas Company, Mr. Hodgson joined the home engineering corps of the U. G. I. in Philadelphia, subsequently being detailed to the charge of its branch in St. Augustine, Fla. In this position he remained only a short time, going from there to Gloversville, N. Y., acting as engineer to the electric division of the U. G. I. interests in Gloversville and Johnstown. His success was so marked and positive that when the position of General Manager of the Fulton County Gas and Electric Company (succeeding corporation) became vacant, through the resignation of Mr. L. D. Spragle, he succeeded the latter, in which capacity he satisfactorily served, until death intervened. He was (1903) united in marriage to Miss Katherine Hurd, of Brooklyn, N. Y., who survives him, with one son and a daughter. Other direct next of kin who survive are his father and mother, a sister and two brothers—one of the latter (Mr. Eugene H. Hodgson) is a well-known resident of Montreal. Deceased was an active member of the American Gas Institute, of the National Commercial Gas Association, and of the Empire State Gas and Electric Association, had only recently resigned the Presidency of the Automobile Club, of Fulton County, N. Y., and was also an active member of the famous "A. T. D. Club," of Cornell. He was a man of irreproachable habit, possibly a trifle reserved in personality, but nevertheless a man whose work was ever in line with safe progress.

PHILADELPHIA SPECIFICATIONS FOR ALLEY AND SUBURBAN LIGHTING.—For the current year Philadelphia has a contract with the Welsbach Street Lighting Company of America, for about 20,000 60-candle power gasoline lamps for lighting alleys and country roads. For 1914, however, it is proposed to open the bidding to all sorts of light, bids to be received on candle power specifications made by the bidders themselves. Advertisement was made, calling for the receipt of bids on September 4, but there were no bidders and it is probable that bids will be called for again within a short time. The special points of interest in the specifications are the following: Bidders will be required to furnish lamps and the lighting, and necessary maintenance thereof, and to light, extinguish and clean the same, such light to be used for the illumination of the streets, avenues, boulevards, sidewalks, alleys and other public places in the city of Philadelphia; also to furnish and erect new posts and to properly maintain all property which comes within the scope of this contract. The lamps are to be lighted in accordance with the time table made a part of the specifications, the lamp lighters not to climb the posts except by ladder leaning against the post. The number and location of lamps will be determined by the Director and may be changed from time to time. Lamps will be tested photometrically to determine their actual street illuminating power, and the lamps shall be of such kind and shall be so maintained that each complete, including accessories, will give a light of not less than the candle power, stated in the proposal at an angle of 15° below the horizontal, as determined by the tests specified. The light which is furnished on the average as determined by tests on not less than one per cent. of all the lamps each month shall be of not less than the above specified candle power.

DANGEROUS LIGHT.—In the "Moniteur de l'Industrie du Gaz," M. Berthelot gives some useful warnings as to ultra-violet rays. He declares that, beyond the violet in the spectrum, one finds about ½ octave of invisible ultra-violet rays, which are in no special sense harmful to the eye; but that beyond these is another of still more rapid ultra-violet rays, which are destructive of life and very harmful to the eye, these rays passing through quartz but not through glass. Consider a mercury vapor lamp, of glass. In action it heats, and if it heats up too much, the glass will soften. Therefore quartz is used instead of glass, for the softening point of quartz is 1,440° F. higher than that of glass. A quartz mercury vacuum lamp can be much harder driven than a glass one, and consequently, for a lighting power of 800 to 1,500 candles, instead of a glass tube 40 inches long, quartz tubes, 2.4 to 4 inches long may be used, which may become red-hot, and the so-called "vacuum" within it may present a pressure of as much as 2 atmospheres. These quartz tube lamps are very convenient and are finding their way into general use; but with them is the great danger that they emit torrents of the short-wave ultra-violet rays which lie beyond the the first octave outside the visible violet of the spectrum; and these rays have the power of killing animal and vegetable cells. They are stopped by glass, but not by quartz, so that a Cooper-Hewitt lamp does no particular harm to the eyes. But from the high candle power quartz lamps, every person who uses them at close quarters suffers more or less. If you bring the face within 12 inches for 20 seconds, it will cause almost immediately the well known effects of sunstroke, with an intense smarting pain, followed by destruction of the skin, redness, blistering, etc. The most dangerous of these effects are upon the eyes, which show a severe conjunctivitis, that may take days to disappear. It is plain, then, that when a quartz lamp is used it should be surrounded with a glass globe, to cut off the dangerous rays. This may do for lighting railway tracks or the like, but one could not, without apprehension, see these extended to street lighting. What would happen if one of these globes was accidentally broken? Who could guarantee that it would be replaced without delay? Think of the danger to anyone who stopped under such a lamp to read a newspaper.

CURRENT MENTION.—

THE Porto Rico Gas Company development, of San Juan, Porto Rico, under the engineering charge of Mr. J. A. Mayers, has reached the point of installing meters, ranges, lighting fixtures, etc., and the well-settled intention of Mr. Mayers and his associates is to have at least 2,000 ranges hooked-up ready for use when gas is turned into the mains by January 1, 1914. The Company has occupied its well-fitted offices, and is there daily demonstrating the advantages of gas for use in the street, factory, business house, theater and home, on every account to which it may be applied. The advance demonstrations are being carried on through the not altogether satisfactory agency of blau gas; nevertheless, the trial expositions are being made to audiences numerically many.

THE Orlando (Fla.) Water and Light Company has equipped the handsomely arranged domestic science department of the Cathedral Science School with a 6-burner gas range, cabinet type. With this equipment, Miss Holly, who is in charge, is doing excellent work, practically instructing the Misses as to that which they will likely later be called on to overlook when in mansions of their own.

THE Chamber of Commerce, La Porte, Ind., has been actively engaged in securing funds for the equipping of two new buildings to be devoted to certain manufacturing purposes. To show its good faith in the premises, the proprietors of the La Porte Gas and Electric Company subscribed the substantial sum of $500.

THE Automatic Gas Regulator Company, of Chicago, has been incorporated by Messrs. McDonald Lane, L. A. Landon and J. F. Royer. It is capitalized in $20,000.

MR. JOHN DALY, for 33 years in the employ of the Brooklyn Union (N. Y.) Gas Company and its predecessors, died at his home in Brooklyn, October 29th. He was in his 60th year, 40 years of which were lived in the Eleventh Ward of Brooklyn. He is survived by three daughters. The funeral services were held in the Church of Our Lady of Mercy, the morning of October 31st, and interment was subsequently made in the Cemetery of the Holy Cross.

THE franchise for the construction and operation of a gas plant in Bremerton, Wash., has been awarded to Messrs. Bockheimer & Shepard, of Seattle, Wash., who are under agreement to commence construction work on or before January 12, 1914.

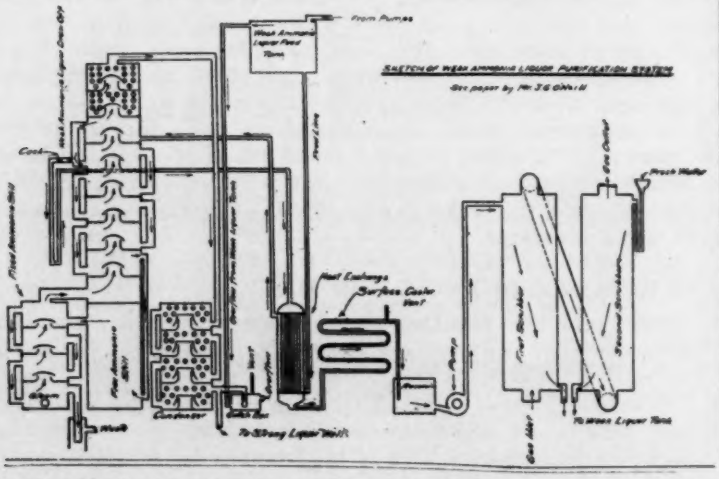
CHIEF ENGINEER BYRON T. GIFFORD, American Public Utilities Company, is outlining a plan for enlarging the plant of the Utah Gas and Coke Company, Salt Lake City. It is on a scale sufficiently large to indicate that $200,000 will be required to carry it to completion.

THE Wall Street *Journal* avers that holders of approximately $100,000,000 outstanding bonds of the Peoples Gas Light and Coke Company, and of the Commonwealth Edison Company, will not have to pay any income tax on such securities. The tax (amounting to $45,000) will be paid "at the source," thus relieving the holders from paying "at the mouth."

(Continued from page 295.)

the unrevivified oxide, when a box is exposed for cleaning. Constant attention is necessary to prevent firing of the mixture in revivification.

From the foregoing we note a great part of the cost and danger in purifying coal gas has been from the handling of the purifying material The use of a weak alkaline ammonia solution to absorb the hydrogen sulphide, cyanogen and some of the carbon dioxide from the crude coal gas, minimizes this handling and revivifying of oxide, greatly decreasing the liability to accident, reducing the cost of purifying and saving valuable space.



The alkaline solution is prepared in a crude ammonia still by increasing the feed of gas liquor to it, and drawing off this increase of liquor near the outlet of the first or second ring in which it has been subjected to the action of steam containing a high percentage of ammonia vapor. This liquor is then cooled to 86° F., or lower, and pumped into the first scrubber, taking the place of the usual gas liquor wash. Since every coal gas plant of any importance contains an ammonia still and gas scrubbing apparatus the only extra equipment required for this process, is a cooler for the washing liquor coming from the still. The point at which this wash liquor should be drawn from the ammonia still depends upon the temperature attained by the liquor. For instance, if the liquor is drawn off at 212° to 213° F., tests show the liquor has doubled its content of ammonia, but has not lost its maximum of hydrogen sulphide and carbon dioxide; if the liquor is drawn off lower down in the still, at a temperature of 214° to 215° F., we find that the content of ammonia in the liquor is practically equal to what it was when it first entered the still and it loses its maximum of hydrogen sulphide and carbon dioxide. If we go still lower, drawing it at a temperature of 217° F., the per cent. of ammonia drops off and it is not sufficiently alkaline for washing gas. The place in the still, either the first or the second wash ring, whichever attains a temperature of 214° to 215° F., is the point at which to draw off the wash liquor, since there it is almost pure ammonia solution possessing greatest alkalinity, and absorbs the greatest quantity of hydrogen sulphide and carbon dioxide. Gas liquor of approximately 1 per cent. ammonia strength, when subjected to this treatment, loses 80 to 90 per cent. of its hydrogen sulphide and 70 to 80 per cent. of its carbon dioxide. When crude coal gas is washed with this prepared liquor, 1 gallon of it takes up on an average, 500 grains of hydrogen sulphide, and, if used in sufficiently large quantities, will reduce the hydrogen sulphide in a gas containing 900 grains per 100 cubic feet down to 20 to 30 grains. We do not try to wash out all the hydrogen sulphide, but to reduce that content of the gas so low that, adding 1 per cent. of air, the oxide in the first box is always revivified and the gas issues from this box without a trace of H_2S.

If we attempt to wash out all the hydrogen sulphide, considerably more wash liquor is needed, and we do not get an elimination of 500 grains per gallon of 1 per cent. ammonia wash liquor. The nitrogen in the air introduced to keep the iron in the purifying mass oxidized is practically off-set by the carbon dioxide absorbed from the gas by the liquor wash. In other words, the liquor wash takes from the gas a volume of carbon dioxide almost equal to the nitrogen in the air introduced for revivification, thus adding oxygen without cost. This is proven by the fact that when crude gas, after treatment with the liquor wash and containing 20 to 30 grains of hydrogen sulphide, is put through a foul box with 1 per cent. of air, the gas loses every trace of H_2S. and the oxide in the box is revivified.

Cyanogen also is absorbed from the crude gas by the liquor wash and the iron oxide is no longer rendered inactive by it. For this reason we have been able to use oxide until it contained 68 per cent. of free sulphur, and then discarded, not because saturated with sulphur, but because it was badly caked, causing excessive back pressure.

With ¼ of the space and oxide necessary in ordinary practice, it has been possible to purify free from any trace of hydrogen sulphide, over 100,000 cubic feet of gas per bushel with previously discarded purifying material containing 38 per cent. sulphur.

In this process the oxide plays a minor part, taking from the gas only the small quantity of hydrogen sulphide remaining after the liquor treatment, and is used continuously until it contains 60 to 70 per cent. of free sulphur, without removing the mass from the purifying box or expending any labor on it. We thus eliminate all the labor upon revivification of oxide and save much space formerly necessary for this purpose.

The danger of explosions or fires from the tendency of the mass to heat is practically eliminated, because the iron in the mixture is now always in an oxidized condition and the mixture does not heat when exposed to the air.

The process is entirely mechanical, care being taken not to allow the liquor wash to go to the first scrubber warmer than 86° F., and to see that the gas is properly cooled before entering the scrubber. The only skill necessary is to be able to read thermometers, and correctly gauge the quantity of liquor to use.

For purifying 600,000,000 cubic feet of gas by this method, the cost was as follows:

Labor	$0.0005
Oxide	0.0010
Steam	0.0010
Total cost per 1,000 cu. ft. coal gas	$0.0025

This ¼ of a cent per 1,000 cubic feet is for coal gas containing 600 grains of H_2S per 100 cubic feet, which of course is not fair to the wash liquor process when compared with the cost of ordinary oxide purification of 400 grains per 100 cubic feet. This new process of purification does not in any way increase the labor of concentrating ammonia liquor or decrease the yield of ammonia from the coal.

To show what the wash liquor process really means, assume a plant manufacturing 1,000,000 cubic feet of gas per day. With a gas carrying 600 grains of hydrogen sulphide per 100 cubic feet, it has been found that a saving (including interest and depreciation on equipment) of 70 per cent. of the cost of purification can be realized together with a great saving in space required. If oxide purification of this gas were costing 1¾ cents per 1,000 cubic feet (1½ cents works' cost, plus ¼ cent interest and depreciation) the reduction of 70 per cent. in purification cost would mean an annual saving of over $4,000. In addition to this cheaper operation we are almost entirely eliminating the element of labor, are free to use any grade of coal which we can purchase to advantage, and, as far as purification is concerned, we can supply any market for gas, no matter how variable its demands. The process gives us a clean, small plant of enormous purifying capacity, and at no time dangerous to life or property.

In the gas industry, as in all industries, the future will demand of us cheaper, safer and more elastic methods. This new method of purification is one of the steps toward the attainment of that end.

Standards of Quality and Pressure of Oil Gas.

[A paper prepared by Mr. W. H. Papst, for the Twenty-first Meeting, Pacific Coast Gas Association.]

With the advent of public service commissions the establishing of proper standards of quality and pressure has received an impetus, due to the fact that rates are inseparably connected with quality. All such considerations ultimately resolve into conserving for the benefit of the public the natural resources of the country, and extracting from them the greatest value in the most efficient manner. This view has been adopted by commissions, and, being well established, it may be used as a basis upon which to elaborate.

It is obvious that one standard, equitable for all sections of the country, is out of the question, since each community is differently situated as to the raw materials available. For this reason, the most suitable raw material, treated in the most efficient manner, will indicate the proper quality of supply in each locality. Based upon

these premises, this paper will treat of Pacific Coast conditions, with special reference to oil gas.

Without going too far into the history of oil gas manufacture, it is necessary to consider the surviving methods of production, as exemplified in a few of our large cities. The early history of oil gas manufacture has its seat in Southern California, co-incident with the development of the oil fields. The prevailing practice is to distribute a medium grade gas, slightly above 600 B. T. U., with the production of moderate quantities of lampblack and rather large quantities of pitch and tar. To Southern California belongs the distinction of first working up the lampblack into commercial fuel, a by-product of such value as to seriously influence the determination of quality. In the northern part of the State the practice differs, by producing a richer oil gas, and mixing with blue water gas made from the briquetted lampblack, giving a final product about 650 B. T. U. In the northwest, methods are similar to the Southern California practice, save that the production in these plants is along the lines of large yields of gas and lampblack, with a minimum production of pitch and tar. A comparison of these divers methods, shows the necessity for a thorough investigation to determine which best represents efficiency in production and conservation of natural resources. It is evident that the final value to the consumer from a gallon of oil must be the deciding feature, which should be expressed in some definite standard; and I believe that the consensus of opinion is that such a standard should be expressed in terms of heating value only.

The commercial efficiency of the manufactured product seems to be dominated entirely by the question of by-products. In the manufacture of oil gas, the briquetted carbon has proved the most wonderful of solid fuels—a worthy companion of gas in its purity and efficiency. The profits from the sale of this commodity enormously increase the field of operations of a gas company, attracting new consumers without losing the old ones, and it has practically met a long felt want—namely, wholesale heating—for gas cannot yet compete with other fuels for this purpose. By keeping out the coal man we can keep in the gas meter.

One feature in this connection is the reduction in overhead costs by increasing the volume of business. The more one considers the more fallacious appears the using of salable by-products for the production of gas, when the latter can be produced from additional raw materials, without the losing of the profit from residuals. The writer of this paper wishes to go positively on record as favoring the production of as much lampblack as possible, even at the expense of the gas yield, with complete elimination of tar and pitch.

It seems that the greatest economy in operation is reached, with the cessation of the production of tar and pitch, at a point between 535 and 550 B. T. U. The consequent reduction in holder costs, due to additional briquet sales, enables the selling price of gas to be correspondingly reduced, working a direct benefit to the consumer. It is obvious that one also opens up new fields for the use of gas in industrial lines, which must result in a further increase in sales. Besides the increase in volume and reduction in selling price, we give our solicitors a formidable weapon against a straight, crude-oil heating system, principally on the score of safety and simplicity.

The development of the gas business along these lines has hitherto been handicapped by legislation, but a definite stand by the Pacific Coast gas fraternity should produce results with the commissions and local authorities.

The distribution of gas, from the standpoint of quality, is all in favor of a gas containing no hydrocarbons in vaporous form, a gas in which all the oil has been converted into either lampblack or gas. Low grade gas will not suffer in transmission by high pressure (high pressure distribution is much practiced on this coast), and it has been likewise found that the problem of pipe jointing with Dresser rubber gaskets, is much simplified by the elimination of the hydrocarbon condensate. Further, the gas meters, which are the index of our earnings, attain an extraordinary degree of accuracy, extending over much longer periods when the diaphragms are not subject to the dissolving effect of liquid hydrocarbons. From the lower specific gravity of the gas there results an increased efficiency in transmission and distribution by the greater capacity of the system, with a corresponding reduction in investment charges.

Having discussed efficiency of production and distribution, we must consider it from the standpoint of utilization. The requirements of the consumer must be examined, to ascertain if his needs can be adequately served by the quality found most efficient from the production and distribution standpoint. Modern investigation shows that the efficiency of combustion has but little relation to the calorific value; but that the various uses of gas are far more dependent upon flame temperature, flame volume, and the specific heat of the nitrogen and other products of combustion.

On the other hand, gas of high calorific value, meaning high percentage of hydrocarbons, is difficult to burn completely, which imperfect combustion tends to the production of odors, and, in some instances, to dangerous carbon monoxide; and to the blackening of ceilings and fixtures, detrimental to general cleanliness, the strongest asset of gas fuel. The writer's experience in Portland, Ore., where candle powers from 15 to 19 have been distributed at various periods, has fully demonstrated that the public preferred gas of a lower quality, from a convenience standpoint, as shown by the large number of complaints with high candle power, and their cessation with the re-establishment of a lower standard.

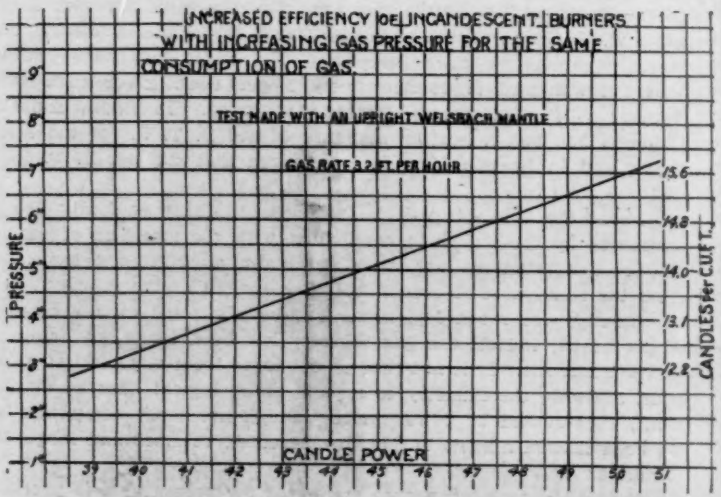
These considerations in connection with the proper standards of quality might seem dictated by my personal experience, and it is, therefore, pertinent to mention briefly the trend in the East and abroad. Recent investigations by the Committee on Calorimetry, of the Commission and gas corporations in the Second District of the State of New York, show a radical change in favor of a lower standard than those previously accepted, with strong leanings to still further reductions eventually. Quoting from this report, page 12: "It is difficult, indeed, in view of the uncertainty as to just how fast certain changes in conditions governing gas manufacture and distribution will take place, and as to what the final situation will be, to determine the proper value at which to set the standard. It has been shown that some time in the future the standard may have to be 525 heat units, or lower." Feeling abroad has crystallized even more definitely in favor of a very low standard. In 1906 the calorific value of 500 net B. T. U. gas was adopted for Tottenham, England, and even previously illuminating values of the London Company in force were equivalent to calorific values fully as low. On the Continent, Paris and Rheims have adopted a value of 528 net B. T. U., and Milan, 573 B. T. U. In Germany, during 1909, it was concluded there should be a calorific test and that the same was set at 543 gross B. T. U. It should be noted that it is customary on the Continent to correct the gas volume to 32° F. instead of 60°, which means that the standard is comparatively 5 per cent. lower than these figures; *e. g.*, 543 gross becomes 516 gross. In South America, Colombo has had a heating standard of 400 B. T. U. for the last 5 years, and in Buenos Aires it is required that the net B. T. U. be not less than 539."

From the above it will be seen that nothing radically new is advocated by the writer in connection with the standard of quality. The recommendations are made solely on an efficiency basis, and from the standpoint of economical development of the industry.

Entirely too much legislation has been enacted on the strength of precedent; indeed, the gas industry has been too much hampered by its traditions. Is it not time to cut loose from meaningless standards, allowing the industry to expand along logical lines of development, represented by lower prices, and, since most companies are all organization and no output, by increased volumes and larger net earnings?

Before determining proper standards for pressure, it is pertinent to inquire what function is fulfilled by pressure requirements in the distribution of gas. These may be divided into: First, requirements for the transmission of the gas through the mains; and, second, the needs of the consumers' appliances. When gas is transmitted under what is commonly known as high pressure, the distribution problem does not enter, but the distribution of gas at low pressure, measured in inches of water, bears a fixed relation to the area of the territory to be covered and the capacity of the system of mains with respect to the volume to be furnished. It is evident we are confronted again with the requirements of the locality. Considering that most utilities have been established for many years, and that the distribution systems have grown up with the community, conditions may prevent the realization of a theoretically ideal system. The public service commission may, however, and should, insist on such expenditures as are possible and advisable to correct glaring defects. Assuming that this has been done, it is obvious that the initial pressure to be carried must be such as to give service to the remotest consumer. A differential pressure is commonly assumed of ½ inch per mile of main, which would seem a fair allowance to supply the necessary volume. This amount should, therefore, be added to the necessary pressure required by the consumer. We must also consider fluctuations of pressures, which are a principal cause of complaints by the consumer. It is apparent that, with a higher initial pressure, the percentage of fluctuation will be less at the outskirts of the system, and regulation correspondingly easier. To illustrate: If the extreme points of the system are 3 miles from the nearest holder, it will mean a variation of pressure of at least 1½ inches at the initial point, so that, if the maximum allowable pressure were three inches, the suburbs would have only 1½ inches, or a variation of 50 per

cent. But if the maximum pressure allowed were 8 inches, with a like loss in transmission, there need be no variation in the suburbs, while the variation at the initial point would not exceed 20 per cent. There then remains the question of altitude, a factor beyond the control of the utility, an allowance for which has always been considered in previous regulations by the Commission. Pressure requirements are somewhat dependent upon the specific gravity of the gas, which, again, depends upon the quality of the gas manufactured, and it follows that to provide the same results the street pressure must be varied inversely as the specific gravity. Inasmuch as nearly all appliances burning gas use a siphon effect for mixing the gas with proper proportions of atmospheric air, and since the amount of air entrained is proportional to the mass of the gas, and since the mass is proportional to the specific gravity, it follows that, with gases of different specific gravities, to produce the same results will require a different street pressure. A much greater efficiency in the utilization of gas can be brought about by approaching as nearly as possible the theoretical limit of primary air admitted for complete combustion. Inasmuch as the limiting feature in air mixers is the propagation backward of the explosion wave, which must be overcome by the velocity through the mixer of the air and gas, it is essential that the pressure be ample to insure this. It follows, likewise, that the higher the pressure available, the nearer the mixture may be brought to the theoretical limit, which means greater efficiency in utilization. These facts are strikingly illustrated by the increased efficiency of incandescent lighting at higher pressures, such as the wonderful street lighting systems in European cities. The same applies in a lesser degree to ordinary incandescent lighting by low pressure. To illustrate this I had our laboratory make some experiments, which are platted on the accompanying chart,



showing how remarkably the consumer benefits by increased pressures. As a corollary, the lighting capacity of the various units is much increased, enabling competition by electric units to be more easily met. To illustrate: A 4-burner arc can be replaced advantageously by a 3-burner arc, if street pressure is available to operate it at high efficiency. It follows also that the danger from flashbacks is much reduced with the higher pressures. The consumer also benefits by a saving in time, effected by the increased rate of combustion, which incidentally reduces the radiation losses.

The requirements of industrial appliances necessitate in the same manner the greatest available pressure at the nozzle. In many cases a lack of this makes it necessary to install boosters, or air blowers.

From the above it would appear fallacious, and to the direct detriment of the consumer, to set an upper limit on the pressures carried in the distribution system. No gas company will increase the pressure in its mains beyond a point of economical demand, for fear of leakage, and it does not appear that the higher pressures are anything but a blessing to the consumer.

The standards for oil gas to be adopted on the Pacific Coast with due regard to the development of our business, should be based upon the most efficient methods of production with respect to the conservation of our natural resources; and it appears further, that oil gas conditions require the production and distribution of a gas of lower calorific values than those at present prevailing, and that the same is in accord with the trend of gas practice in the Eastern states and abroad. Conditions for efficient utilization of our product require that no upper limit be placed on pressures.

Inasmuch as no standards have as yet been established on the Pacific Coast, it behooves us in this convention assembled, representing all sections of the Pacific Coast, to determine in advance the proper standard to urge upon the commissions, lest ill advised legislation, which is always difficult of repeal, should retard our further progress.

Recent Decision, State Commissioners.

Supreme Court Upholds Paterson (N. J.) Gas Rate Reduction.—Justice Swayze (Supreme Court) has handed down a decision in the case of Public Service Gas Company *vs.* Board of Public Utility Commissioners, certiorari to determine the legality of an order of the Board fixing rate for gas in the Paterson territory at 90 cents, upholding the order of the Commissioners reducing the rate. In summing up the situation, the opinion says: "We have dealt with the legal principles underlying the case, but the ultimate question is a question of business, and the results cannot be predicted. In such a case the Commissioners ought to move with caution. We think in this case they have done so.

The legal points dealt with relate principally to questions of value, going value, reasonable return and franchise value. The adoption of the Commission's order was opposed both by the Public Service Gas Company and by the citizens of Paterson and Passaic, which cities, the court points out, "Have obviously mistaken their remedy, since the only effect of a judgment in certiorari is to set aside an existing order, and if the order is set aside the old rate for gas would remain unaltered."

Under Section 38 of the Public Utilities Act the court may set aside the order of the Commissioners, "When it clearly appears that there was no evidence before the Board to support reasonably such order, or that the same was without the jurisdiction of the Board."

The practical question for its determination is whether the rate of 90 cents is just and reasonable.

The first question is whether it was just and reasonable for the Commissioners to segregate the Passaic district from the rest of the territory supplied, and fix a rate based upon the property of the Company and its earnings in that district alone; and, "Whether dense centers of population shall share the advantage of lower cost of manufacture and distribution with more sparsely settled sections is a question of public or business policy, and that policy the courts ought not ordinarily to attempt to control by substituting their judgment for that of the Commissioners, to whom the Legislature has intrusted it. * * * The solution of the question must turn largely upon custom, upon the history of the production and distribution in the territory in question, upon the actual location of the manufacturing part of the plant, upon the size and character of the plant at which the greatest efficiency can be secured, sometimes upon the boundaries of the municipality, and sometimes in a country as thickly settled as New Jersey upon the contiguity of different municipalities. The district fixed by the Commissioners was a district formerly supplied, since 1899, by the Paterson and Passaic Gas and Electric Company. It is densely populated, and the different municipalities have with the increasing population been growing into one another. Substantially all the Commissioners have done is to adopt as a unit a district which had long been treated as such by the owners. As far as appears, the district was large enough to secure the advantage of large scale production, and compact enough to secure economical distribution. We think the action of the Commissioners in this respect was within the limits of their discretion and was just and reasonable."

The court proceeds on the theory that, "On the one hand, a just and reasonable rate can never exceed, perhaps can rarely equal, the value of the service to the consumer. On the other hand, it can never be made by compulsion of public authority so low as to amount to confiscation. A just and reasonable rate must ordinarily fall somewhere between these two extremes, so as to allow both sides to profit by the conduct of the business and the improvements of methods and increase of efficiency. It must allow for possible competition, and be such as will allow the ordinarily, well-managed, or ordinarily well-located, concern to exist without giving an artificial advantage to the more skillful or better located.

"One of the difficulties is to properly allow for a return due to superior skill. If rates were adjudged just and reasonable in accordance with the net returns upon the whole investment, the skillful, prudent, economical manager would have no advantage over his least skillful and most imprudent rival, and the fruits of his skill would be seized for the benefit of the public. The necessity of public regulation of rates arises out of the monopoly of the public service company. The

unregulated price of the service ceases, to be determined by competition, and the individual consumer is unable to contract on equal terms. Fixing rates by public authority may secure to each individual the advantage of collective bargaining by-or-in behalf of the whole body of consumers, and result is such a rate as might fairly be suppposed to result from free competition if free competition were possible. A just and reasonable rate, therefore, is necessarily rather a question of business judgment than one of legal formula, and must often be tentative, since the exact result cannot be foretold.

"The real test of the justice and reasonableness of an individual rate seems it should be as low as possible, yet sufficient to induce the investment of capital in the business and its continuance therein. This also is a business question, and depends on the opportunities that may be offered for more profitable investments and the risk involved. The Commissioners thought a return of 8 per cent. on the value of the plant was an adequate return, and this does not seem to be disputed?

"The Commissioners undertook to ascertain the present value of the property. The cities insist that only the cost of reproduction should be allowed. We are met with difficulties and valid objections whether we adopt the standard of actual investment, of cost of reproduction or present value. We think the great weight of authority is in favor of the standard of present value."

After pointing out the differences which exist in the valuations made by contending parties, the court says:

"The controversy turns mainly on the allowance for going value and the refusal to allow anything for the value of the franchise. For going value or cost of developing the business, $1,025,000 was allowed. The cities claim that no allowance at all should be made, and their writ was prosecuted to secure the correction of this alleged error. The Company insists there should be allowed about twice as much, including preliminary expenses and cost of development. It is necessary, therefore, to determine, first, whether any allowance at all for going value is proper. We think both on weight of authority and on reason there should be such an allowance. The cost of a gas plant includes, not merely the loss of interest while the plant is in course of construction and is building up a paying business; but, even in the case of an old established plant, there must be loss while pipe lines are extended to await the coming consumers as the city extends. There is the cost of securing and retaining customers, of encouraging the greater use of gas for fuel and for light, the necessary loss attending experiments that promise improvement, the obsolescence of plant, apart from the ordinary calculable depreciation which may be charged to current expenses instead of being capitalized, the expense that must attend and the additional value that arise from the uniting of separate concerns, the organization of a great industry with a view to economical production, and the cost of procuring capital for the original works or subsequent extensions. What items should be charged to construction; what to business development; how much to current expenses, and how much to permanent investment of capital, are all important practical business questions. However these questions be solved, all these expenses must be met. Whether they shall be met at the expense of present consumers by being charged at once to current expenses, thus reducing the net return and making necessary a higher rate, or whether they shall be capitalized in whole or in part and constitute a permanent addition to capital, or be capitalized and gradually amortized, are business questions. The legal question is whether these items constitute a going value upon which the company is entitled to a return if the individual rate is to be just and reasonable. To this we answer yes."

It is pointed out that the question of propriety of allowing for the value of special franchises is one not yet settled upon authority. The New Jersey taxing laws recognize them as property and tax them accordingly. Says the Court:

"Such franchises, however, are property of a peculiar kind. The right of property in them is not absolute, but is qualified by the right of the State to fix reasonable rates. Where, as in this case, the rate is not fixed and may be changed, there is no stable basis upon which to calculate the value of the franchise, since that value is dependent upon the rate. There is, however, a sense in which the fact that franchises are the subject of gift may be important. The value of the gift to an existing company may be destroyed by a similar gift to a new corporation, and it is obvious that, in order to determine the wisdom of investing in the enterprise, the newcomers would be under no necessity of seeking a return upon a franchise for which they were to pay nothing. Since it is in the power of the State to bring about a supply, without compelling the public to pay on the franchise valuation, beyond the actual cost of procuring it, it would be likely to do so, and the effect would be to destroy the value of the special franchise of the existing company. These considerations lead us to the conclusion that logically no allowance should be made for the value of the special franchise in a case where it is not legally exclusive and where the State still retains the right to fix rates. That is the present case."

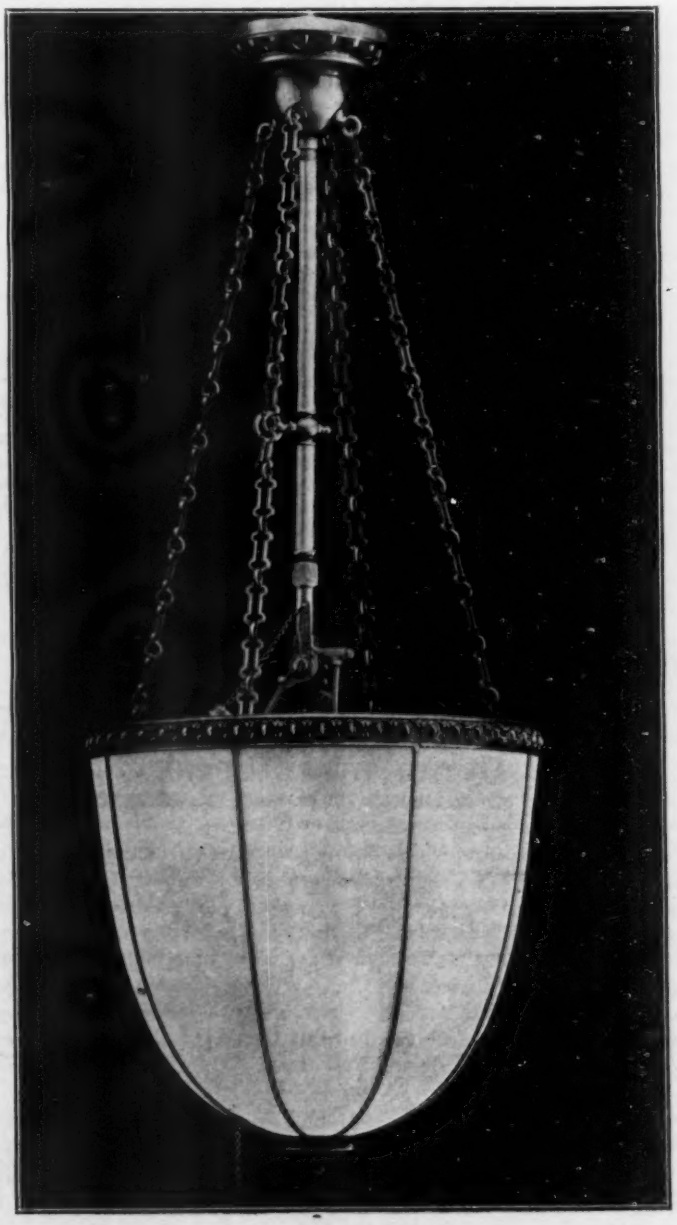
On the relation of the investor to rate reduction the Court says, after holding that the par value of the shares is no measure of the value of the franchises in 1899, the date of the merger:

"We should be the last to adopt a rule that would deprive innocent persons of a value based upon the law existing at the time of their investment. * * * We are, however, to administer the law as it exists. At the time of the consolidation of the Companies in the Passaic district (1899) it was well understood that the rates of public service companies were subject to public regulation. * * *

"Every stockholder must be assumed to have taken his stock with knowledge of the law, and the same knowledge must be imputed to every bondholder. He may have thought that the State would not exercise its power to his disadvantage and have paid more for his stock on that account; but the State had done nothing to mislead him. If he depended on the State's inaction, he took the chance of its exercising its power, just as he took the chance of the Company's being managed successfully. He acquired his stock, not upon the basis of any assurance by the State that the then existing rates would continue, but upon his own estimate of the chances and future value. That there was no assurance of the continuance of then existing rates is demonstrated by the fact that the company itself has pursued a policy of constant reduction."

New Methods and Appliances.

SEMI-INDIRECT FIXTURE FOR HIGH POWER UNIT.—Messrs. Bagley & Sons, manufacturers of gas and electric fixtures, have just brought



out their No. 7529 "Equalite" fixture, designed especially for high power units. It it a particularly tasteful design and effects very serviceable distribution of lights. Those members of the American Gas Institute who happened to visit Keith's Theater in Richmond, saw a good example of "Equalite" illumination, all the lighting fixtures in that new playhouse being of this product.

OXIDATION OF COAL AND OF THE PROCESS OF COMBUSTION.—The meeting last month of the Chemical Engineering Society, Mr. H. C. Porter of the U. S. Department of Mines, described some researches of that department. It is known from the work of investigators in European laboratories and from earlier work at the Bureau of Mines that all coals unite with oxygen more or less at ordinary temperatures. The action is largely a simple addition, very little gaseous products of combustion being produced, but there is a development of heat and this heat development is the primary cause of spontaneous combustion. As the temperature rises, the oxidation reactions increase rapidly in rate, and the simple addition reaction becomes complicated with the development of water and oxides of carbon as products of the oxidation, and with the production of water and methane and some other gases by destructive distillation.

Under whatever conditions coal burns, whether on the fuel bed of a furnace or in suspension as dust in the air of a mine, the earlier stages of oxidation at lower temperatures have important bearing on the ease of ignition of the fuel, and the degree of inflammability of its dust. In order to throw more light on the nature of the combustion reactions at successive stages, and to determine how the various kinds of coal differ in their rates of reaction with oxygen, a laboratory study was made of the oxidation of coal, at temperatures ranging from 80° to 300° C. A series of experiments has been run with samples of different coals in atmospheres of pure oxygen at a pressure reduced so as to equal the average partial pressure of the oxygen in air. The rate of absorption of oxygen by the coal was determined by admitting pure oxygen at a rate to maintain constant pressure in the apparatus. Large differences in rate were found between different kinds of coal, and the comparative oxidation rates thus found conform in general to the known comparative degrees of inflammability of these coals tested.

At temperatures above 200° C. the production of CO, and other gases causes a considerable error in an experimental method which does not remove these gases as they are formed. A rapid stream method was, therefore, devised in which weighed samples of dry coal were heated at definite temperaturcs in a stream of dry air for 1 hour, the change in weight of the coal being accurately determined as well as the amounts of H_2O, CO, and CO produced. From these data the oxygen used and the oxygen fixed were calculated.

It was shown that the oxidation of coal consists, in the earlier stages, of the formation of an unknown complex of the coal substance with oxygen, and the more or less gradual dissociation of this complex, as the temperature rises, into water, CO_2 and CO. Below 200°, water is the chief product of this dissociation, the proportion of CO_2 in the products increasing as temperature rises. Carbon monoxide is a primary product of the oxidation of coal at temperatures between 100° and 300° C. and possibly also outside of this range. Triangular diagrams representing the relationship of the three products H_2O, CO, aad CO at different temperatures show interesting tendencies—*e. g.*, toward constancy in ratio between CO_2 and CO within a certain temperature range.

The production of water by oxidation of coal at 100° C., or lower, is of interest in connection with the devising of methods for accurate moisture determination in coal. The direct production of CO at moderate temperatures is of interest in connection with mining operations and the storage of coal.

Items of Interest
FROM VARIOUS LOCALITIES.

RECENT advices from Philadelphia are to the effect that the American Gas Company has acquired control of the Phœnix Gas and Electric Company, of Phoenixville, Pa., which control means also proprietorship of the Consolidated Schuylkill Gas Company, the Schuylkill Valley Illuminating Company, and the Montgomery and Chester Electric Company. Also, the Chester County Public Service Company, of West Chester, Pa. The operators of the American Gas Company will likely connect the lines of the West Chester Company with those of Phoenixville and Pottstown.

MANAGER O. C. JOHNSON, of the Ironwood (Mich.) Gas Company will shortly perfect plans for an enlargement of its manufacturing system, the generating apparatus to be of the coal gas type. The expenditure on such account is put at $25,000, the new system to be up to a make of 160,000 cubic feet per day.

THE Illinois Traction Company has purchased the properties of the Clinton (Ills.) Gas and Electric Company, and will put the same in proper working order.

TOWARDS the close of last month, Mr. M. M. Sweetman, General Manager of the Kansas City (Kas.) Gas Company, visited St. Joseph, Mo., to deliver to the family of the late Mr. Kerr Murray Mitchell a beautifully bound brochure carrying the preamble and resolutions expressive of the regret experienced by the Natural Gas Association of America over the death of Mr. Mitchell, who was one of the organizers of the named body. The text of expression is: Whereas, since the last annual meeting of this Association death has removed from the roll the name of one of our honorary and most esteemed members, Mr. Kerr Murray Mitchell, of St. Joseph, Mo., and,

Whereas, His fellow members of the Natural Gas Association of America desire to record their appreciation of the high character of their late associate, and to express regret concerning his demise, therefore, be it

Resolved, That the decease of Mr. Mitchell deprives this organization of one of its most valued members. Always deeply interested in the proceedings of our conventions, by his modesty, his geniality and his unvarying courtesy, he gained the friendshihip of every member of this body, whose intercourse with him is pleasantly remembered. The feelings of regret which his demise occasious us are in unison with our sympathies for his widow and children, who are berefit of a kind and affectionate husband and father, while the community of St. Joseph suffers the loss of one of its best and most useful citizens.

THE Public Service Commission of West Virginia, has decreed that no gas, water, or electric corporation may increase the rates charged for such services, without the express sanction of the Commission, following a public hearing in each instance. This pronunciamento was uttered in that several corporations had issued notice of increase in rates, to become effective the first inst. Governor Hatfield backs this notification, declaring that, should any such rate changes be insisted upon, a special session of the Legislature will be called to enforce the Commissioner's fiat.

"M. P. H.," writing from Arlington, Mass., under date of the 31st ult., incloses this mention: Dear JOURNAL: Mr. E. E. Locke, for several years Superintendedt of the Arlington Gas Light Company, has resigned therefrom to accept the Superintendency of the Light, Heat and Power Company, of Boston. His associates experience much regret over his going away from them, but, to show their appreciation of him, the evening of the 26th inst., having been invited to attend an assembly of the employees, he was presented with a purse, well filled with coins of gold. The presentation was heartily and eloquently made by Mr. W. J. Costigan; and the recipient's reply was of like order. Refreshments followed the speeches, and a right fraternal evening was thoroughly enjoyed."

THE proprietors of the Lynchburg (Va.) Traction and Light Company have announced a dollar gas rate for that beautiful, fast-growing Southern city. It is effective at once.

THE special shareholders' meeting of the Worcester (Mass.) Gas Light Company, held the 5th inst., to consider an increase in its capital stock to provide for the expenditures incurred in extensions and additions to its Quinsigamond avenue works, acquiesced in the plan.

"GEORGIA," writing from Atlanta, under date of the 29th ult., says: "The City Council, Waycross, Ga., has granted to the Scott Investment Company and W. H. Harrison, Jr., of Birmingham, Ala., a franchise to operate a gas plant in Waycross, the agreement to run for 33 years. It is stipulated that construction work shall be under way by the first of December, that the main system should not be less than 25 miles, and that the city should have the right to purchase the property at the end of 25 years, the takeover to be accomplished by 3 arbitrators or valuators. It is further stipulated that the Company shall not combine with the local electric lighting concern, and it is said that a cash bond of $5,000 was deposited with the authorities by the grantees."

THE recent boiler explosion at the Livingston (Staten Island, N. J.) plant of the Richmond Light and Railroad Company, unfortunately put its power plant out of commission, cutting off the current to scores of public street lamps. Ordinary consumers, however,

were, in much better shape, in that they could call on the gas man. Manager Welsh, of the New York and Richmond Company, responded, of course, in his usual vigorous, successful fashion. Meanwhile, energy brings its current reward, for the sendout of the Company immediately increased 15 per cent., and the construction division of the Company was literally swamped with applications for new services.

THE Sprague Meter Company, of Bridgeport, Conn., has just completed a brick addition (60 ft. by 45 feet) to its factory, which structure was erected in response to urgent, immediate demand for additional floor space—it is the third addition to the Sprague works in as many years. With a sharp eye to the future the Company also announces its purchase of a 17 acre tract of land in East Bridgeport, and has planned to construct thereon next spring a new foundry and other structures neceessary to the carrying on of its rapidly growing trade.

IN further connection with the Sprague Company's recent doings it is timely to note that Mr. Jno. C. Clark, who for the past 3 years has represented the concern in the middle-West, has been recalled to the factory, over which he will hereafter act as Production-Manager. This will afford the clever Mr. Clark an opportunity to make good, practical use of the experience gained by them in the respective shops of the People's Gas Light and Coke Company, of Chicago, and of the Laclede Gas Light Company, of St. Louis, and puts him in direct line for further quick advancement.

MR. GEORGE F. MITCHELL, who has had charge of the commercial division of the Red Wing (Minn.) Gas Light and Power Company since last June, has resigned that position to accept the place of Commercial Manager of the gas division of the staff of the Jackson (Miss.) Light and Traction Company. He took charge in Jackson last Monday.

THE Pacific Gas and Electric Company has been ordered by the authorities to institute these rates for an electric current supply in its Phœnix (Arizona) branch: 16 kilo-watt hours, or less, per month, $1; over 16 kilo-watt hours, 6 cents per k.w.h. To take effect forthwith.

THE proprietors of the Brockton (Mass.) Gas Light Company have awarded to the Bartlett-Hayward Company the contract for a new storage holder, to be located on the south Skinner street site, just north of the Company's existing storage vessels, the total capicity of which is about 2,600,000 cubic feet. The new holder is to have a diameter of 144 feet, and is rated to a capacity of two million cubic feet.

MR. HENRY G. BEYER, JR., has beeen elected to the vacancy occasioned in the Dictorate of the Portland (Me.) Gas Light Company, through the death of Mr. Elias Thomas.

THE annual net earnings of the Massachusetts Gas Companies, for the year ended June 30th, last, were $3,019,473, as compared with $2,597,850, in 1912. In the like comparison period the Edison Company net earnings were respectively $3,298,014, as against $2,710,750.

"YOU should note the chest measurements of 'Steve' Monahan and 'Kerkie,' the head man of the works' force and the office man of the Haverhill (Mass.) Gas Light Company, in the recent bowling contest in the Regal alleys. Each scored a total of 265 in the last contest. I might also say that 'Monahan' is anxious for a one man-go with the 'boss bowler,' home office, United Gas Improvement Company. Will you just print this as it is sent you?—BAY STATE." Well, Mr. Bay State; it goes as above, virtually as it came to hand.

THE return to the City Treasurer, made by Mr. George A. Stiness, Treasurer Pawtucket (R. I.) Gas Company, regarding the output of the Company, for the quarter ended September 30th, shows that the 2 per cent. royalty on the gross netted the city the sum of $1,290.17.

"B. S. M." writing us under date of the first inst., says: "Mr. E. L. Callahan, General Director, New Business Division, the Byllesby Corporation, is just now busily engaged in organizing the new business division of the Louisville (Ky.) Gas and Electric Company. Although many changes in the methods heretofore followed will necessarily be made, it is not probable that these will occasion the displacing of many (if any) of the present force."

MR. H. C. HOAGLAND, since 1908 General Manager of the Byllesby corporation gas and electric power plants in Muskogee, Okla., has been promoted to a like place in connection with the corporation properties at Fort Smith and Van Buren, Ark., and Sapulpa, Fort Gibson and Muskogee, Okla.

ACCORDING to returns, collected for the City Council of Kansas City, Mo., by Mr. Joseph H. Crawford, City Gas Inspector, it is shown that in January, 1913—that month having been taken as an example—20,301 gas consumers used more than 10,000 cubic feet of gas (natural) per day, and that 33,133 consumers used less than 10,000 cubic feet daily.

THE United Water, Gas and Electric Company, of Hutchinson, Kas., recently placed an order for cast iron pipe (with a Birmingham, Ala., concern) the weight of which amounted to ½ million pounds.

MR. K. L. SIMMONS, Superintendent gas division, Birmingham Railway, Light and Power Company, has resigned that position, to become Vice-President and General Manager, the El Paso (Tex.) gas plant. This will be effective December, 1st, 1913.

"ON the 31st ult. the City Council, of Mount Pleasant, Ia., consented to the terms of a franchise for the supply of gas to that city, asked for by Mr. George Carson, of Iowa City, Ia. The grant, which is to last for 20 years, means that Mr. Carson will purchase the plants of the existing Mount Pleasant Gas and Electric Com pany. He proposes to make a substantial reduction in gas rates and to put the plant in fitting condition—'tis pretty well run down now. The franchise will have to be voted on by the ratepayers in special election.

"B. M. V.," writing from Milwaukee, Wis., incloses this: "The first meeting of 'The Gas Meeters,' composed of members of the working force of the Milwaukee (Wis.) Gas Light Company, was mainly notable for a bowling contest, tried out at Herman Rotoff's alleys on Muskego avenue. While the scores were fairly good, they nevertheless were not sufficiently 'average' to warrant their publication. The organization is a branch of the National organization of like name, and it will hold periodical meetings for social reunion during the winter season."

"B. V. L." in a note from New Britain, Conn., says: "Our local Gas Company is consonance with its old practice of reducing the rates whenever the current conditions permitted it. is out again with a new schedule, to become effective January 1, 1914. The gross is to go $1 per 1,000 cubic feet, with a discount of 10 cents per 1,000 on all accounts settled within 15 days. The prepayment rates are to be changed to provide for the supply of 250 cubic feet of gas for 25 cents, instead of 220 feet, as now charged.

E. A. MURPHY, of Vinton, Ia., has applied to the authorities of Virginia, Minn., for the right to there construct a gas plant. Strange to say, although the residents are outspoken for the plant, the Council seems opposed to making the grant, not that the opposition is based upon a gas works *per se*, but that it is held the plant should be constructed and operated on municipal account.

"MASON," writing under date of the first inst., sends us this: "For a second time a jury has disagreed (after a 4 days' session), in the case of J. and G. Golsner, florists, of College Point, N. Y., against the New York and Queens Gas Company. Complainant sued for $5,500 damages caused to their greenhouse plants (mainly carnations) by escaping gas from faulty pipe. The complainants, who make a specialty of growing carnations, declared that, early in 1911, they discovered that their seeding was wilting. Investigation showed that gas escapting from a street main, had gone through the street soil into the soil of their gardens, and destroyed the growth. This case, first tried in 1912, before Judge Kelly and a jury, resulted in a disagreement, and the current case (before Judge Clark) terminated likewise.

MR. HENRY M. WALLACE, of Detroit, President of the Waxahachie (Tex.) Gas Company, is our authority for the statement that gas will be turned on by the 15th inst. The plant was turned over by the contractors the 24th ult.

FOR the quarter ended September 30, 1913, the royalty paid by the U. G. I. Company to the authorities, under the agreement between the Company and the city of Philadelphia, amounted to $426,307.71. The corresponding return on like account last year for the comparing period was $314,070.22.

The Market FOR GAS SECURITIES.

Consolidated ruled steady in the week, despite the fact that Mr. Murphy went to Good Ground, Long Island, on Wednesday. Good Ground has been, since the early times, even when it was the stamping ground of the original Aquebogue Indian Tribe, a haven for lame ducks; especially in the historic sheltering spot known as Canoe Place. In fact ducks are being there put-out-of-business every morning now, as they wing it from Tiana into Shinnecock. All of which is suggested through the thought that Mr. Murphy's "influence" was largely gained in the early days, when he dispensed "refreshments" to the stokers of the old New York and Manhattan (East side stations) Gas Light Companies; and to the later days when he and the late Senator Sullivan were won't to "regulate" city gas rates. However, costly as was the lesson, the 80 cent rate has not been altogether without its compensations. The Company has declared its regular quarterly of 1¼ per cent., payable the 15th prox. The opening to-day (Friday) was made at 129 to 130.

The situation over in Brooklyn is again becoming "intensified," this time the trouble taking the form of an assault proposed to be made on the Company's plan of declaring a 3 semi annual and an extra of 1½. The malcontents (possibly they are only discontents) contend that the Company should make it 3 regular and 1½ extra for each 6 months. In this distribution the desire is to get back the 9½ per cent. not paid in the stormy times of 1906, or so. The attack is being led by that singularly pure and high-minded citizen, Bourke Cochran, whose disinterested services to himself are particularly well remembered by that other shining light, Mr. Richard Croker. However, the "plan and scheme" will be threshed out at the B. U. G. annual meeting to-morrow. The gentlemen in charge can be safely counted on to do that which is best for the real interests of the Company. Meanwhile the share quotations are: Bid, 122½; asked, 127½.

Lacledes are unaccountably low, especially the common, for which only 97 is asked. The dividend return is 1¾ per quarter. Yet the Company's actual returns for the first 9 months of 1913 show an earning at the rate of 8.56 per cent. for the twelvemonth. The total outstanding common is $10,700,000. In respect of the ownership by the Washington (D. C.) Gas Light Company of 3,530 shares of the Gesrgetown (D. C.) Company, the former (in the dissolution suit brought against it by the District Commissioner) stoutly avers that, having been the undisputed owner of the shares for 20 years or so, "The Company's ownership of the shares has ben, by legislative enactment, acquiesced in and impliedly ratified and approved by Congress."

On November 5th the shareholders of the Worcester (Mass.) Company ratified the proposition to emit an addiiional 2,000 shares; and the shareholders in the New Britain (Conn.) Company will to-morrow consider the Directors' proposal to increase the capital to $600,000, from $500,000.

Peoples, of Chicago, is not attracting much attention just now, from a speculative standpoint, but its affairs are going along smoothly, the current quotation (122½ to 122½), however, looks rather low for a dividend earner in the 8 per cent. list. The market for gas bonds is quite good just now.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

NOVEMBER 10.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par alue of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$99,816,500	100	129	13
Central Union Gas Co. —				
1st 5's, due 1927, J. & J.	8.5 0,000	1,000	101	103
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	105	106
Mutual Gas Co.	8,500,000	100	157	157
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	99	101
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	59	63
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98¼	100¼
New York and East River—				
1st 5's, due 1944, J. & J.	8,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	98	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	100	102
Standard	5,000,000	100	102	104
Preferred	5,000,000	100	93	94
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	93	95
The Brooklyn Union	15,000,000	1,000	122½	127½
1st Con. 5's, due 1948, M. & N.	15,000,000	—	103¾	107
Yonkers	299,650	500	180	—
Out-of-Town Companies.				
Laclede Gas Co., St. Louis.	10,000,000	100	95	97
Preferred	2,500,000	100	—	102¾
Bonds	10,000,000	1,000	102¾	103
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	
Massachusetts Gas Companies, of Boston	25,000,000	100	91½	92
Preferred	25,000,000	100	92	92¾
Montreal L. H.& P., Canada	9,000,000	100	206	208
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	5,000,000	25	188	190
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	122¾	122½
1st Mortgage	20,100,000	1,000	102	102½
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105¼
Pacific Gas and Electric Co.	15,500,000	—	23	24
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	96	98
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	108
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's	3,447,000	1,000	94	96
Syracuse Gas Co., N. Y	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
United Gas Imp. Co.	55,502,950	50	168	169
Washington (D. C.) Gas Co.	1,800,000	200	420	422½
1st Mortgage, 6's	600,000	—	—	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, New York, October 21, 23, 1914. Officers: President, W. H. Gartley, Philadelphia Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting————1914. Officers President, A. A. Dion, Ottawa; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct., 1914. Officers: President, J. T. Hutchings, Rochester, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street, New York City.

Gas Meeters.—Monthly Section Meetings; Grand Commissioner, Will. W. Barnes, East Orange, N. J.; Gen'l Sec'y, H Thurston Owens, La Crosse, Wis.; New York Section, Chairman, W. H. Pettes; Secretary, G. E. Smith, Sipp Avenue, Jersey City, N. J Philadelphia Section; Chairman, Stanley Grady; Secretary, H. E. Stetler, Broad and Arch streets. Cleveland Section, Chairman, F. R. Hutchinson; Secretary, Wm. Holtz, East Ohio Gas Co. New England Section, Chairman, T. W Jennings, Boston; Sec., F. K. Wells, 60 Broad street, Boston. Winona Section, Winona, Minn., W. F. Clausen, Chairman. Bethlehem Section, Trueman Weithrecht, Chairman; Sec.-Treas., Truman Buss, South Bethlehem, Pa.

Guild of Gas Managers of New England.—Annual meeting, March, 1914. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, March 18th and 19th, 1914 Chicago, Ills. Officers: President, W. F. Barrett, Chicago, Ills.; Secretary-Treasurer, Horace H. Clark, 115 No. Oak Park avenue, Oak Park, Ills.

Illuminating Engineering Society.—Annual meeting, Cleveland, O., September, 1914. Meetings of Sections, monthly. Pres., Charles O. Bond; General Secretary, J. D Israel, 29 W. 39th street, New York City. Sections: New York, Secretary, C. L. Law, 124 West 43d street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, J B. Jackson, 26 North Market street. Pittsburgh, Secretary, J C. Mundo, Oliver Building.

Indiana Gas Association.—Annual meeting, March —— —— 1914. Terre Haute. Officers: President, A. S. Cooke, Terre Haute; Vice-President, A. C. Blinn, Evansville; Secretary-Treasurer, Phimer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, Davenport, May 27, 28, 29, 1914; Officers: President, B. C. Adams, Lincoln, Neb.; Secretary, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, October —— 1914. Arkansas City. Officers: President, Al. Newman, Arkansas City; Secretary and Treasurer, Ivan Thomas, Wichita Kas.

Michigan Gas Association.—Annual meeting, September, 1914. Place, undetermined. Officers: President, H. W. Douglas, Ann Arbor, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1914, Mexico, Mo. Officers: President, P. A. Bertrand, Joplin, Mo.; Secretary and Treasurer, P. W. Markham, Brookfield, Mo.

National Commercial Gas Association.—Annual meeting and gas show, Dec. 1-6, 1913. Philadelphia, Pa. Officers: President, C. W. Hare, Philadelphia Pa.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, St. Louis, Mo., May 19 and 20, 1914; Officers: President, E. L. Brundrett, Kansas City, Mo.; Secy-Treas., T. Clive Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, 18th and 19th, 1914, Boston. Officers: President, T. H. Hintze, Providence, R. I.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Annual Meeting, July —, 1913, Asbury Park N.J. President, C. F. Butcher, Freehold, N. J.; Sec'y-Treasurer, O. F. Potter, Newark, N. J.

Ohio Gas Association.—Annual meeting, February ——— 1914 Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—Annual meeting, Oklahoma City May, ——1914. President, F. R. Bowman, Ada; Secretary-Treasurer, H. V. Boze Oklahoma City.

Pacific Coast Gas Association.—Annual meeting, Long Beach, Cal., September ——— 1914. Officers: President, C. S Vance, Los Angeles, Cal.; Secretary-Treasurer, Henry Bostwick, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, Allentown, Pa., April ———, 1914; Officers, President, J. A. Frick, Allentown, Pa.; secretary-Treasurer, W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 11, 1913; monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city.

Southern Gas Association.—Annual meeting, Mobile, Ala., April 4, 1914, Officers: President, James Ferrier, Rome, Ga.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting, May———— 1914, Galveston, Tex. Officers: President, G. H. Gifford, Fort Worth Tex.; Secretary H. S. Cooper, 405 Slaughter Bldg., Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May ————1914. Milwaukee, Wis. Officers: President, Ewald Haase, Milwaukee, Wis.; Secretary-Treasurer, Henry Harman Milwaukee, Wis.